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ABSTRACT

This document is the first volume in a 5-part series that reports the results of a project undertaken to critically review and analyze major longitudinal studies of child and student development. These studies were conducted to discover the variables, techniques, methodologies, and problems pertinent to evaluative studies of the effects of schools and colleges on the growth and development of children and young adults. It was anticipated that study results would provide guidelines for the future research needed to enhance educational program planning, implementation, and evaluation. This volume represents a preliminary summary type review of some of the relevant issues suggested by the research; outlines a beginning framework and set of criteria for the analysis, synthesis, and evaluation of the longitudinal studies examined; presents the specifications of one of four models being developed as a framework for the synthesis of the findings; and examines the initial implications of the review for the further efforts of the project and related research. (Page 48 missing) (Author/DN)

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AN ANALYTICAL REVIEW OF LONGITUDINAL AND RELATED STUDIES AS THEY APPLY TO THE EDUCATIONAL PROCESS

Preliminary Report

Volume I

by

Arthut Gerst and James W. Trent

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PREFACE

The Analytical Review described herein is one of several projects initiated by the Office of Education to provide the best possible basis for future research on the effects of schools throughout the range of grade levels and educational settings. The Review is to analyze selected major research on educational impacts in order to provide guidelines for the future research needed to enhance educational program planning, implementation and evaluation.

The present report is intended solely as a preliminary review of relevant issues suggested by some of the research under consideration and of the criteria and framework derived to go about the difficult task of synthesizing, "analyzing" and evaluating the research. The synthesis and analytical review of the research will follow in subsequent reports.

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James W. Trent
Principal Investigator

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INTRODUCTION

A thorough understanding of the growth and development of students during and after their stay in the educational system has always been extremely important to educators. There is no other way to provide improvements in the educational process for the benefit of diverse student needs. This point is particularly pertinent now when American society is in a restive period described by many critics as being in the throes of a cultural revolution (See Roszak, 1969).

This is partially true because major aspects of the "revolution" take the form of protest from minority students who feel disenfranchised by the schools and from many middle class students who are disenchanted with established values and procedures in the schools and the larger society. Another contributing factor is the reaction of much of established society to student protest repressively through categorical criticism of the schools and withdrawal of their financial support.

At the same time understanding of the development of students through the educational process has never been sufficient nor easily gained. The problem is not so much a matter of lack of research on the subject, as witnessed by the extensive review of research on early childhood and adolescence provided by the Hoffmans (1966; 1964) and the equally extensive review of research on college-age youth provided by Feldman and Newcomb (1969). The problem is rather that there has been insufficient synthesis, critical examination, and application of the research to major topics that bear on the influence of schools on students as they progress through different ages

The Hoffmans and particularly Feldman and Newcomb offer a very useful start in this direction. The two volumes the Hoffmans assembled reviewing research on child development are comprehensive; they cover the age range of early childhood through adolescence and include overviews of diverse topics such as development of language, concepts, thinking, attitudes, occupational roles, and socialization in reference to the family, classroom, and larger society. Yet, by nature of the objectives of their volumes, what remains are just that: overviews of the theory and research in child development. There is no systematic evaluation of measurement or research procedures involved in dealing with key variables across age groups and school settings.

Feldman and Newcomb conducted what we view as an exceptional "analysis of four decades of research" on colleges' impact on students. They covered the question of stability and change during and, to some extent, after the college years in reference to diversity of student and faculty background and characteristics, institutions, major fields and residence groupings. They indicated consensus of findings regarding major variables and provided relevant composite charts of findings, samples, research instruments used, and the sources of the research. They also included pertinent notes on problems of interpretation and methodology. The scope of this review, however, did not entail a systematic evaluation of instruments, measurements and items used, critical combinations and interactions of variables, and positive or inadequate procedures of research and sampling design and methodology.

Much remains to be done, in this context, including the identification, synthesis and evaluation of the following:

(1) recurrent variables associated with the influence of the family and school environment and processes on student development within and among different age groups;

(2) convergent information about these variables essential as a reference point for policy planning for and implementation of needed improvements in the educational system;

(3) divergent or lacking information about key variables indicating the nature and direction of additional research needed for program planning and development;

(4) redundant research no longer needed;

(5) particularly effective research strategies, methodology and instrumentation of value for needed research in this context;

(6) availability of data banks that would be of great use in further research on the educational process.

THE ANALYTICAL REVIEW

These information needs provide the research objectives of the present Analytical Review of Longitudinal and Related Studies. Under the auspices of the National Center for Educational Statistics of the U.S. Office of Education, the Higher Education Program of UCLA's Center for the Study of Evaluation is undertaking an intensive critical review and analysis of a select number of paramount studies which explore the growth and development of diverse kinds of students during and after their stay in different formal educational environments. Greatest emphasis will be placed upon students and comparable non-student populations between the ages of 14 and 30, but attention is also given to early childhood.

The Analytical Review has several purposes: first, it will provide a synthesis of findings and data; second, it will suggest guidelines for a nationwide developmental study proposed by the Office of Education to examine the influences that educational processes and institutions have on students of diverse backgrounds; and finally, it will develop guidelines for future research and for use in developing educational status reports, planning, and policy.

The review is being conducted in three phases:

Phase I: Analytical Survey

The first phase is concerned with a descriptive review of several studies with implications for the Office of Education's proposed developmental study, and with the development of data pools of particular use to such a study. The steps involved in the Phase I review of these studies were as follows:

(1) Selection of the studies. The opinions of a broad-based panel of experts were sought to help identify important studies to be included.

(2) Selection of topics. Guidelines for describing and evaluating instrumentation methodology, and design were developed by the Analytical Review Staff, guided by careful consideration of several sources of expertise covering these subject areas (see, Hyman, 1955; Campbell and Stanley, 1963; Anastasi, 1968).

(3) Study documentation. A comprehensive descriptive analysis of each study was conducted to provide an overview of the studies in terms of their objectives, relevance to the proposed Office of Education study, research procedures, and major findings.

Phase II: Synthesis Report

The objective of the second phase is (1) to synthesize and colligate major findings of the review, culminating in pertinent models and a summary rating "matrix" of all studies, topics, data, and techniques examined; (2) to indicate the relationship of these findings to the proposed longitudinal research; and (3) to develop a "User's Manual" cross-referenced by instrument and topic, providing evaluation and technical details about the measurements, instruments, items, and samples used in the studies reviewed. The study findings can then be applied to the proposed Office of Education study and to other projects and concerns of the educational community.

Phase III: Final Report

The final synthesis, interpretation, and recommendation will be developed through three stages:

(1) A basic report will (a) provide interpretative commentary on the synthesis of study materials, (b) propose relevant hypotheses regarding the educational process and means of testing hypotheses, (c) give consideration to the project's implications for policy formation, (d) suggest a strategy for the Office of Education's proposed study and subsequent research on the educational process and guidelines for the development of a national data bank, and (e) indicate the feasibility and advantages of a simulation of the educational process, the inputs of the simulation suggested by the review, and the possible applications of the simulation and resultant insights to be gained about the educational process from such activities.

(2) Developmental conference. Approximately 12 researchers from the first phase of the study will be invited to convene with the Project staff and the Office of Education representatives primarily to discuss the basic review of the Project.

(3) Final report. The basic report will be revised on the basis of criticisms and recommendations resulting from the developmental conference.

The present report indicates the progress of the first phase of the Project. There follows discussion of key substantive areas gleaned from the research, analysis themes and strategies, statistical procedures, the project's procedures for analyzing and evaluating the research, the presentation of specifications of one of four models being developed through the project as a framework for the required synthesis of findings; and implications of the review to date for the further efforts of the project and related research. Appendix A comprises a description of the research under analysis and Appendix B classifies and describes the instruments included in the research according to their conceptual domains. The appendices may be found in volume II of this report.

KEY SUBSTANTIVE AREAS

A summary description of educational issues and problems encompassed by the studies under review follows. Some general gaps in knowledge are noted with respect to each of these issue and problem areas, but more thorough elaboration of theoretical, measurement, and methodological developments and inadequacies awaits the evaluative phase of the project.

Cognitive Development

The acquisition and development of differentiated skills spanning the high school curriculum as well as such general skills as reading comprehension, verbal

ability, abstract reasoning, and critical thinking were topics of several studies. Parallel concerns in each of these studies focused upon educational experiences and social environments facilitating or inhibiting growth.

Interest in such topics evolved from a variety of educational needs and issues. Project Talent, a longitudinal study of some 400,000 high school students nation-wide, is a case in point (see Shaycoft, 1967).* It is devoted to:

1. Developing an inventory of human resources,--or, more specifically, an inventory of the capacities and potentials of the nation's youth.
2. Developing a set of standards for educational and psychological measurement.
3. Developing a comprehensive counseling procedure for guiding students toward various careers.

Some additional issues are posed and dealt with by Shaycoft. To what extent is cognitive growth during the high school years dependent upon such growth previous to entry into high school? Is there an underlying order or organization of mental abilities which becomes increasingly congruent as development proceeds? Finally, is it possible to distinguish empirically between increments of achievement and development of aptitudes, the former relating to manifested capacity, the latter referring to potential capacity?

Husen (1967) addressed his efforts principally toward the productivity and development of educational systems as agencies in the social and economic development of the world's societies. In concerning themselves with educational systems, the authors focus on particular modes of integrating policy, administration, instruction and selection. For Lehman and Dressel (1963), the overriding concern is the impact of a particular educational program in implementing such global goals as:

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*Project Talent, under the general direction of John Flanagan of American Institutes of Research, has produced an impressive bibliography of publications among which the Shaycoft study cited here is representative.

> "the development of skills in critical thinking and problem solving and the development of such attitudes and values as may be acquired by the understanding of the physical universe, of the methods of science, of social organization and the process of social control, and by a study of man himself." (p. 2)

Several other issues might be pursued here. For example, public schools offered courses in civics, social studies and citizenship presumably designed to instruct students in the elements of America's political system. However, studies of citizen knowledge of the political process, and of the rights and obligations associated with citizenship in a political democracy repeatedly demonstrate what the authors view as an ill-informed and frequently uninvolved electorate. It is perhaps time that the cognitive development goals of public education be extended seriously to upgrading the political sophistication of the 18-year-old voter.

An assumption here is that goals of this kind would contribute to educational relevancy which has become an issue of increasing intensity during the past decade. To enhance this element of relevancy, investigations of cognitive growth might well probe areas where traditionally required subject matter leads to student apathy, the extent and effects of retention of acquired skills in these areas, and the impact of growth in such subjects upon subsequent course selection and achievement. There are indications that a "well-rounded education" is induced less effectively by "forced" exposure to a structured program than by a more diffuse program aimed at inculcating a generalized zest for learning, a possibility surely in need of investigation.

In addition, studies of cognitive development to date have given little attention to the degree to which specific subject material and training objectives may be newly introduced at earlier grade levels, the effects of their procedure or the effects of covering subjects in greater depth or of expanding

elective curricula. Finally, there remains a need for continued research across grade levels with regard to (1) the nature of cognitive organization; (2) how growth affects the patterns of cognitive organization; (3) how patterns of cognitive organization affect growth; (4) stages in cognitive development; and (5) the elaboration of the inter-relationships among classroom, family, peer, community, age, sex, and psychological factors and cognitive development.

Non-Cognitive Development

Changes in personality characteristics, values, and attitudes constituted the central themes of many studies. Newcomb and associates (1967), while documenting attitudinal and value change, placed particular emphasis on the normative and social environments encountered during and after their sample's attendance at Bennington College, exploring the impacts of these environments on those persons whose attitudes, values, and psychological dispositions have changed over the study period. The Bennington study addressed itself primarily to the influence of informal social processes and only incidentally to the direct impact of college educational programs on individual development. In analyzing long term stability of values and attitudes purportedly nurtured in college, these researchers stressed social impacts of college (i.e., selective marriages and life styles) over more intrinsically educational impacts such as on critical reading and thought, and on personality structure.

A techno-economic system of society rapidly evolving toward more complex forms comprises the conscious starting point for Trent and Medsker's (1968) research on high school graduates. Reasoning that an increasingly complex society requires not merely technical skills, but values, attitudes and personalities equipped to manage such complexity, Trent and Medsker raise several important educational issues: (1) How can educational institutions more effectively prepare students in terms of cognitive capabilities and personality structures

appropriate to the post-industrial society? (2) What are the educational, vocational, and personality characteristics of those who elect not to enter college, regardless of academic aptitude, compared with college withdrawals and with those who persist in college for four or more years? (3) Armed with knowledge of school impacts on the development of different types of students, can counseling programs effectively regulate these impacts so as to maximize personal and career development while minimizing wastage of human resources? Just what kinds of complexities require what kinds of personalities or the degree to which technical complexity will pervade the various sectors of the economy is not at all clear. However, the issue remains crucial: education must continue to open doors not merely for cognitive attainment but for exploration of and adaptation to one's own personality and the social roles defining one's social existence.

Katz and associates (1968) are intrigued by the possibilities of identifying strategic aspects of college life which are demonstrated to have significant impacts on personality integration. Examples cited are freshman groups, housing, task-oriented extra curricular activities uniting men and women students, and counseling programs. Having identified such strategic areas, programmatic innovations aimed at particular facets of student development, such as occupational and marital choice, could be implemented with ultimate emphasis on individualized approaches. The educational issue is essentially one of adjustive educational policies and programs to deal more effectively with the <u>individual</u> needs and development profiles of <u>individual</u> students.

Lehman and Dressel (1963) were concerned with the extent to which a particular college program accomplishes its goals with respect to the development of values, attitudes, and personality. But, beyond determining the degree of success in achieving changes in these areas, an understanding of the <u>nature</u> and effects of such changes becomes paramount.

The major stimulus for the development and financing of the Bachman study was provided by the endemic issue of dropouts. A study of growth and determinants thereof in adolescent boys focusing particularly on dimensions of "mental health," self concept, values and attitudes, plans and aspirations, and such behavior as dropping out, rebelliousness, and delinquency would contribute, it was felt, to an understanding of such issues as: (1) the extent to which dropouts are "pushed out" of disturbingly dissatisfying school environments; (2) the nature and degree of dissatisfaction with different kinds of school environments; and (3) the relative importance of school and non school factors in determining dissatisfaction with school.

Kagan and Moss (1962) investigated continuity of behavior and personality from pre-school years through early adulthood. Despite an absence of data pertaining to school characteristics and experiences, the authors' research infers the importance of school related experiences, especially during the elementary phase, for adult behavior and personality dispositions. The issue emerging from this study should be a serious educational concern. That is, selected adult motives, attitudes, and behaviors have their roots in childhood. However, contrary to popular convictions of the past, these behaviors and dispositions are not immutably fixed during infancy and preschool periods. Rather, the process of identification with and involvement in an expanding repertoire of cultural roles, a process in which the school's function is crucial, constitutes a primary mold in which behavior and personality begin to assume their eventual forms. Thus, the degree to which educational programs are successful in promoting student growth and development during the high school and college years may be heavily dependent upon similar success during the elementary and junior high school periods.

While non-cognitive development has become a favorite topic for research, the proliferating base of studies and data has yet to derive a mature theoretical foundation or to provide an unambiguous catalogue of findings. Inadequate controls for self-selection into and out of the educational system has deferred confident judgments as to the general impacts of education on student development. Assuming the significance of educational impacts reported in these studies, explanations of what kinds of institutional characteristics or programs are responsible for what kinds of development and how such influence is manifested remains obscure. Except in summary fashion, we still know little about the interaction of personal, environmental and institutional factors. Moreover, a wide array of non-cognitive variables have been investigated in isolation with minimal success in establishing patterns or organizations of values, attitudes, and personality characteristics that develop in concert. Finally, and perhaps most importantly, presumptions about the significance of non-cognitive growth for human adaptation and creativity have remained incompletely explored. Do certain values, attitudes, and personalities indeed reflect maturity in our modern world? If so, how do complex diversities in social, economic, and political life affect the requirements of maturity?

Vocational and Educational Careers

Bachman and associates (1970) raised the important question as to the efficacy of high school planning relative to the vocational development of students. Their inquiry aims toward an empirical verification of long advanced theories stipulating high correlation between vocational development and high school programs or courses providing information about occupations, vocational guidance and counseling, and job placement.

Project Scope (Tillery, et al.) seeks the determinants of differential distributions of high school seniors into college and non-college occupations in "patterns" or "channels" which students establish for themselves through the high school years. These patterns and channels are defined in terms of "choice behavior" and "decisions." Several issues are thus forwarded. Are educational and career paths the results of identifiable patterns of decisions? When do such decisions occur? How tenacious and rational are these decisions? What are the home, school, and community influences on the sequence of choice behavior? In retrospect, how satisfied are graduates with the decisions made by or for them?

Trent and Medsker (1968) pursued several themes along these lines. First, the quality of post-high school occupational activities were traced by means of breakdowns on types of colleges attended, types of non-college occupations held, mobility, marriage and unemployment. Second, the attributes of persons distributed in these various categories were analyzed. Third, occupational mobility, vocational expectations and aspirations, and job satisfaction were appraised among both those with no college experience and those with some college experience. Fourth, the impact of work as opposed to college milieu upon personality development was investigated. Each of these research problems suggests a corresponding educational issue: (1) What kind of "benefits" in terms of occupational status, job security, and occupational opportunities can be expected by those obtaining a college degree? (2) Is occupational mobility restricted to those eschewing a college education simply because of inadequate education or are restricted mobility and immediate entrance into the post-high school work both reflections of inherently low motivational and intellectual capabilities? (3) Does college experience improve rationality in career choice and ultimately job satisfaction? (4) Does premature entry into the work world stifle growth in

personality areas required for occupational mobility? If so, do work-study programs directed solely at developing technical skills, neglecting maturational factors, introduce artificial "ceilings" to occupational mobility?

Expanding college enrollments and concomitant demands for augmenting the pool of trained college instructors excited Thistlethwaite's (1965) study of factors associated with aspirations to advanced college degrees. The issue of recruitment, of course, has been complicated in recent years by an acute financial squeeze on the nation's colleges, restricting both graduate training programs and job opportunities. An interesting response to this dilemma is to experiment with "half-way" degrees and stepped-up programs which may reduce the costs of expensive, lengthy Ph.D. training programs and increase the proportion of budget expenditures available for recruitment of faculty.

Astin and associates (1969) were concerned with differentiation among colleges with respect to predominant social environments and resultant influences on vocational and educational careers. That colleges may often be characterized by types of faculty, students, and cultures has been demonstrated. That high school graduates may be successfully "matched" to "congruent" college environments, thereby facilitating vocational and educational careers, has not been fully explored. Counseling programs may be significantly enhanced by continued efforts in cataloguing college characteristics and in identifying particular matchups of student characteristics and college environments which prove successful.

In the Career Pattern Study, an outgrowth of a considerable number of years devoted to generating and operationalizing theory related to vocational development, Super and his collaborators (1967) have sought to integrate two educational concerns conventionally isolated in research endeavors: personality development (self-concept) and vocational development. Conceptually, the gap is spanned by an interest in how developing self-concepts are implemented in the process of

choosing and testing occupational roles. However, researchers have experienced much difficulty in deriving testable hypotheses from inadequately formulated theories of self-concept. Thus the outcomes of Super and associates immensely ambitious undertaking should be instructive if not wholly successful. However successful, the issues remain: Can counseling and vocational guidance services scientifically monitor and direct vocational maturation? Are there demonstrable "stages" in vocational development? If so, can vocational "maturity" be assessed in terms of those stages? To what degree does vocational maturity parallel psychological maturity? How and when does the school mediate these developmental processes? What identifiable groups of students respond positively in their development to school influences? Which students are indifferent or actively reject educational influence?

The present economic plight of aerospace engineers and increasingly college graduates in general commands the attention of educational policy makers. While it is true that we presently suffer an economic recession, educators should be aware of growing imbalances in the distribution of professional manpower which are certain to transcend today's financial situation. Too many engineers or a shortage of doctors and paramedical personnel are not simply attributable to laws governing "free" market mechanisms. An educational system which extolls the virtues of college degrees and professional occupations creates an atmosphere which can downgrade the manual and the technical. In this milieu, aspirations overreach realities of the market place; career plans become founded more on status than on opportunity. As a result, not only may new graduates be disappointed at their job prospects, or experienced employees layed-off in preference for young, highly educated neophytes commanding lower salaries, millions of frustrated competitors, both in and out of schools, are faced with searching for new careers, and prolonged unemployment or education.

The Soviet Union with its planned economy has faced the urgency of this problem head on for some time. Attempts to resolve the problem have included mandatory full time employment separating secondary and higher education, examinations, and restricted vocational choice. The applicability of these techniques to our situation is a matter for debate. However, the urgency of this issue will, we believe, continue to intensify throughout this decade, calling for both increased economic planning at the national level, and educational programs consciously designed to meet the requirements of a more rational distribution of manpower. Thus students of vocational and educational development should begin to fill the economic vacuum evident in their research to date with increased attention to expectations and realism in projecting career opportunities. Moreover, perhaps investigators should withhold the label "mature" applied to high aspirations, ambitious plans, and the earning of advanced degrees pending critical analyses of job opportunities, security, and on-the-job competitiveness.

Educational Opportunities

The Coleman Report (1966) set forth four areas of concern, all of which relate to a single issue: differences in the "availability of equal educational opportunities for individuals by reason of race, color, religion, or national origin in public educational institutions at all levels in the United States, its territories and possessions, and the District of Columbia." The four major areas involved (1) the degree of racial and ethnic segregation evident in the public schools, (2) the degree to which public schools vary in offering equal educational opportunities, (3) student achievement, and (4) relationships between achievement and types of schools.

Several related issues are implied by the Coleman Report. Noting that Blacks, Mexican and Puerto Rican minorities tend also to be from lower socio-economic strata, some portion of lowered educational opportunity standards should be accounted for by factors universal to lower class communities, such as a relatively depressed tax base, inadequate physical structures with associated high maintenance costs, inconvenient location for middle class teachers and administrators who might otherwise be motivated to work in those communities, street gangs, and industrial noise.

Thus, segregation by social class may be as important an issue as racial segregation, since it both cuts across the racial line and coincides with it. Do lower class whites have access to the same educational opportunities available to middle and upper class whites? How do lower class whites compare to middle and upper class minorities in terms of educational opportunities? Are there significant differences between lower class whites and lower class minorities or between middle-upper class whites and middle-upper class minorities in educational opportunities?

Educational opportunity may be defined along several dimensions: school facilities and curriculum, characteristics of teachers and administrators, student cultures, learning ambience, and visible models of success through education. To what degree are each of these aspects reflected in racial or ethnic segregation? In segregation by social class? What relationship exists between these dimensions of opportunity? Does an upgraded curriculum and faculty stimulate favorable changes in student attitudes toward learning or does a negative student culture reduce the potency of such an educational program? Can the composition of student culture be altered substantially through integration of whites and non-whites from similar social class backgrounds? Can learning environments in racially or ethnically segregated schools be favorable altered through integration along class lines, leaving undisturbed racial or ethnic compositions?

Achievement levels have often been employed as indicators in comparing the educational opportunities or effectiveness of different schools. However, in comparing schools where segregation is a factor, the use of standards based on relative standings of students on a single test places undue emphasis on achievement per se, consequently neglecting crucial motivational factors. One result is to underestimate educational opportunities and effectiveness of minority schools and to exaggerate, by comparison, these qualities among white suburban schools.

Two additional approaches are indispensable here. The first is to ascertain rates of growth in the achievement areas, either through cross-sectional studies or, preferably, longitudinal designs. Of course, evidence of high growth rates in achievement among schools characterized by high proportions of minority Americans, despite distribution of scores below national averages, would indeed be encouraging. Second, since many areas of achievement involve developmental processes, initial levels of achievement, especially in general verbal skills and other areas demonstrated to influence subsequent learning, should be controlled. Thus differential rates of growth may be expected, and must be empirically acknowledged, given different developmental starting points. That white upper class high school students exhibit higher rates of growth in achievement than do lower class blacks, then, may be less a commentary on the quality of educational opportunities in the high schools than on different levels of overall preparedness for managing high school curriculum.

We have oversimplified the problem, however, with the intention of highlighting the importance of matching achievement standards to realistic expectations. In fact, the minority school with its relatively lower growth rate, but one which exceeds expectations may be more effective than the white upper class school whose relatively high growth rate was not consistent with expectations.

In arguing for developmental rather than simply relative standards of achievement, however, we are not advocating acceptance of the status quo. Rather we are suggesting, as many others have, that (1) attitudes, values and perceptions formed prior to school entry greatly affect achievement after entry; (2) achievement is a developmental process with its locus probably in elementary schools, or at least prior to secondary school; and (3) achievement is not merely the culmination of educational opportunities, but the interaction of opportunities, appropriate motivation, and nurturing learning environments centered in large part outside of the traditional boundaries of the educational system.

Shaycoft (1967) attempted to introduce both rate of growth and controls for initial levels into their achievement scores. However, their efforts are disappointingly frustrated by inadequate data with respect to the characteristics of students and of schools. Certainly it is pertinent to establish variation among schools in effectiveness, employing sophisticated standards of achievement. However, this can only be a launching pad for investigating what kinds of students develop best in what kinds of learning situations and what kinds of school structures best facilitate an optimum blend of the former two ingredients.

Husen (1967) did contribute to an understanding of systemic influences on achievement, but relied on relative achievement scores obtained from a single testing. Educational researchers in the United States might profit from the experience of Husen and his colleagues by expanding their attention from individual school differences to systems differences. In spite of a broadly homogeneous educational system, a closer look at American education probably will reveal rich sources of differentiation along organizational, policy, and curriculum dimensions. In addition, these systemic lines of differentiation extend beyond the school gates into the types of communities supporting the various educational systems. Certainly, with decentralization and community control rapidly emerging as immediate

educational issues, research on a diversity of educational systems, their effectiveness in reaching various types of student populations, and the impact of closer community cooperation with or surveillance of local schools will be required by planners and decision-makers.

ANALYSIS THEMES AND STRATEGIES

The many substantive issues explored by the research projects reviewed here may be assigned to four major categories: (1) the development of, or changes in, psychological dispositions such as values, goals, attitudes, orientations, or combinations of these; (2) determinants of this personal development such as socio-demographic characteristics, normative and value environments of climates, and institutional structures (school and family); (3) student pursuit of educational and vocational careers as evidenced in cognitive learning achievement, goals and plans, college and graduate school attendance, as well as curriculum and vocational choices; and (4) determinants of educational and vocational career pursuits such as student background characteristics, psychological dispositions, normative and value environments or climates (parents, peers, teachers), experiences as students, and school-structured opportunities for learning and career guidance.

Our purpose here is to highlight the major analyses and methods applied to these and other topic areas by the studies under review.

Strategies for Determining the Development of Psychological Dispositions

Trent and Medsker (1968) were concerned with development in three areas. The first consists of a disposition towards learning and general intellectual interests upon which "choosing and mastering a profession, attaining a specialty,

shifting easily from one specialty to another, and having zest for ideas and information" are presumably dependent. Two of the Omnibus Personality Inventory attitudinal scales were employed as indicators of intellectual disposition: the Thinking Introversion scale, which purports to measure attraction for reflective, abstract thought, and the Complexity Scale, which assesses tolerance for ambiguity and intellectual inquiry.[1] Development was conceptualized as change in scores between initial and final testings. Individual scores are standardized for comparability through the use of standard scores based on the original normative mean and standard deviation for these OPI scales.

Data (standard scores) are reported in the form of specified group means whose computed differences between testing are assessed for statistical significance, utilizing the familiar t-test for differences between correlated means. They also tested for differences in the amount of change between groups. Development (or regression) in intellectual disposition then, was empirically defined as change in mean scores and their variances between testing achieving acceptable levels of significance as determined primarily by the above mentioned statistics. Controls for academic aptitude, socioeconomic status and sex were incorporated throughout their analyses.

A second area of psychological development investigated by Trent and Medsker involved the notion of autonomy, an orientation judged as facilitating an "open, flexible, critical, objective, and non-judgmental way of thinking in general." The Social Maturity and Nonauthoritarianism scales of the Omnibus Personality Inventory were selected as indicators of development in this area. Development of autonomy was defined as exactly the same manner as is discussed above with respect to intellectual dispositions.

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[1]The instruments and scales employed in the research under analysis are enumerated and classified in Appendix B.

A third area of change consisted of values and goals vis-a-vis religious, political, occupational, civic, and family life. Lacking consistent data from their initial testing, Trent and Medsker portrayed responses obtained four years after high school graduation and accompanied these findings with retrospective data on self-reported change in religious and other values. Comparisons of college and employed groups on these data may or may not be utilized as indirect evidence of change or development, depending upon the degree to which one is willing to assume (1) that measured differences between the two groups four years after high school did not exist four years earlier, (2) that young adults, facing drastic changes in role responsibilities, and who tend to be idealistic, are highly susceptible to changes in attitudes, and (3) that a college education provides a substantially different opportunity for experimentation with values and attitudes than does employment. Trent and Medsker, while introducing college vs. non-college comparisons, did not attempt to apply this indirect argument for change, preferring evidently to avoid such problematics.

In their study of attitudinal change among Bennington College alumni, Newcomb and associates (1967), attempted to overcome time-bound hazards in assessing change in politico-economic liberalism 25 years after graduation where changing issues and political personages have contributed to evolving definitions of liberalism.

Several complementary methods of measuring change were applied: (1) Individuals were scored on a scale locating each individual relative to his peers rather than on some absolute continuum of liberalism-conservatism. That is, Bennington alumni while not necessarily "liberal" or "conservative," were portrayed more or less liberal than their cohorts with respect to contemporary political issues. Thus, the median score on the Politico-Economic Propensity (PEP) scale divided conservatives from non-conservatives among Bennington seniors, as did the median

on the 1960 Conservatism Index segregate conservatives from non-conservatives some 25 years later.[2] In comparing attitudes in the 1930's to attitudes in 1960, then, individuals remained or became more or less conservative than their peers. Of course, in terms of some absolute determination of political attitudes, the entire sample may have become more or less conservative, the possibility of which cannot be ascertained solely by an above-below median comparison.

(2) Self-reported changes in attitudes were obtained (remained or became more conservative or liberal). This is of course a subjective means of measuring change in an individual relative to some earlier point in his development. By cross-tabulating self-reported change and peer-relative change, the investigators explored the accuracy of self-reported change.

(3) The long-term effects on politico-economic attitudes of change during the college years (remained or became more or less conservative) was examined by computing the percentage of individuals in each of the four change groups who scored above or below the median on the 1960 Political Conservatism Index. Among those whose attitudes changed during the college years, final position in college was compared to initial position as a predictor of 1960 attitudes by holding constant, by partial correlation, the effects of later PEP scores while determining the correlation between initial PEP scores and 1960 scores. Similarly, earlier PEP scores were partialled out of the correlation between later (senior) PEP scores and 1960 scores.

Rather than focusing on changes in attitudes, Kagan and Moss (1962), in their study of maturation spanning the first 30 years of life, have sought patterns of continuity in behaviors reflecting fundamental psychological motives. The notion that personality is largely formulated during the childhood years,

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[2]In addition, an Index of Favorability to Conservative Figures and an Index of Favorability to Non-conservative Figures were employed in the same manner.

gaining a momentum which reinforces in later life stages the patterns established earlier in life served as the contested point of this investigation. Employing behavioral measures of passivity and dependence, aggression, achievement and recognition needs, sexuality, social anxiety, impulsivity, nurturance, irrational fears, hyperkinesis, and introspectiveness as dependent variables, correlations for each of these measures separately were computed between five distinct age groups (0-3, 3-6, 6-10, 10-14 years of age and young adults).

Patterns of development at any given period could thereby be traced to similar patterns established during some previous period of growth. Zero-order correlations techniques were utilized supplying information only for relationships between two adjacent or non-adjacent age groups. In all tests, controls for sex were applied.

Astin and Panos (1969), while emphasizing student development with regard to educational aspirations, plans, and activities, included a list of 21 traits about which their student respondents were asked to rate themselves in comparison with the average student of their own age. This instrument, containing such traits as understanding of others, cheerfulness, drive to achieve, artistic ability, sensitivity to criticism, defensiveness, and stubbornness, was administered during both the initial and followup surveys. Evidence of development was interpreted simply in terms of changes in the proportion of students rating themselves above-average on the various traits.

Lehmann and Dressel (1963) in an attempt to measure changes in critical thinking, attitudes, and values during each of the four years of a college education explored several avenues. First, the t-test for correlated sample means was used to analyze changes in critical thinking, stereotyping, dogmatism, and traditional-value orientation scores from the freshman to the senior year. Second, a comparison of standard deviation scores for pretest (freshman) and post-test (senior) data was analyzed in terms of changes in the dispersion or

homogeneity of scores, with the expectation, on the basis of previous research, that increased homogeneity would occur. Third, the patterns of change were described in terms of the means and standard deviations obtained on each measurement instrument at the beginning and end of the freshman year and at the end of each successive year, enabling the analysis to locate periods of particularly substantial change, rather than to assume gradual change over the four years. Fourth, self-perceived change data gleaned from interviews conducted during the senior year was analyzed for the students describing themselves as having changed their psychological and behavioral dispositions towards such factors as social awareness and tolerance, established authority, college involvement and interests, religious commitments, and academic achievement. Controls for sex were applied throughout the analyses.

Joseph Katz and associates (1968), combining survey techniques and in-depth interviews, utilized several analyses discussed above such as the statistical treatment of changes in scores obtained on pretest and post-test administration of personality inventory scales (in this case, versions of the OPI and Adorno's F-Scale), changes from pretest to post-test in the proportion of responses defined a priori as "mature," and retrospective data as to self-perceived change in personality. Supplementary analysis of case studies and a cluster analysis of items within scales provided a rich source of insights though hardly definitive. The case studies penetrated development in such areas as motives underlying career choice and choice of major, elements of disillusionment with earlier choices, changing self-concepts, reference group loyalties, challenges to self-confidence, social outlets for frustration, and parental influence on decision-making. The cluster analysis of OPI scale items improved conceptual clarity in interpretations of changes in mean scores with respect to the relative impacts of socialization and personality structure, and contradictory attitudes surrounding open expression of feelings.

Strategies for Determining Psychological Development

The major hypothesis guiding the research embodied in Beyond High School (Trent and Medsker) is that:

> personality development--growth of autonomy, intellectual interests, and enlightened self-awareness--will be most evident among young adults who persisted in college for four years, and least evident among their peers who did not enter college. This is expected even with the factors of ability and socioeconomic background held constant. It is also hypothesized that the factors which will be found to be related to persistence in college will be the same ones which are associated with change in attitudes and values, and that this finding will corroborate the idea of the function of predisposition for change (p. 16).

The impact of a college education on personality development was demonstrated in the following ways. First, a multi-group comparison representing increments in exposure to college with respect to personality development is useful in simulating a classical experimental design where length of college education is the independent variable (cause) and personality development the dependent variable (effect). All things being equal (all pertinent controls having been applied), one would look for a linear relationship between the two variables: as exposure to college increases, so the degree of personality development increases. Trent and Medsker delineate three groups of varying lengths of exposure to college: college persisters, college withdrawals, and the consistently employed, each of which was examined with regard to longitudinal change on indices of psychological disposition. Two controls--SES and ability--were applied, both of which are understood to be factors leading to self-selection in college attendance and predisposition to change. In addition, controls for sex were employed. Controls for initial scores on personality indexes were not implemented, although the authors recognized this failing in their research methods.

A second method for evaluating the impact of college education was to analyze personality development among college students whose college experiences

and environments were distinct. Thus, if college exerts an influence on personality development, disparate types of colleges should demonstrate varying degrees of impact, given basic similarities in the kinds of students these institutions recruit. The authors of Beyond High School have specified three types of colleges--public, church-related, private nonsectarian--and three types of universities--public, church-related, private nonsectarian. Comparisons between these groups on personality development were executed, however, without a theoretical framework stipulating what kinds of college environments could be expected to facilitate or inhibit personality development. Individuals' initial scores on personality indexes were not employed.

Factors hypothesized as predisposing change were analyzed with respect to measured change on the Social Maturity scale of the OPI. This particular scale was selected after correlational analysis determined it to be highly related to intellectual disposition, as measured by Complexity and Thinking Introversion scales, to autonomy as measured by the Autonomy scale, to religious orientations as measured by the Religious Liberalism scale, to Impulse Expression, to Lack of Anxiety, and to idea-oriented and people-oriented Strong Vocational Interest Blank occupational scales.

Exceptional, average, and negative change groups were distinguished, using plus or minus three-fourths of a standard deviation of the distribution of change scores from the average change score as the criterion for cutoff points. Chi square distributions pairing exceptional, average, and negative change groups with categorized variables measuring factors predisposing change were then computed. Student academic aptitude, socioeconomic background, orientations toward advanced education, orientation toward knowledge and ideas as educational goals, curriculum preferences (majors), self-concepts, religious affiliation and liberalism, the variety of measured psychological dispositions, and vocational interests

were among the factors examined as possible "determinants" of personality change. Controls for individual initial scores on Social Maturity were not applied. However, the authors note that "it is quite likely, for example, that a person who scored high initially on the Social Maturity scale and then changed significantly in either a negative or positive direction, would differ considerably in many traits from a person who initially scored low on the scales and then changed significantly in either direction" (p. 158).

Newcomb and associates (1967) sought the locus of change (or stability) in those human environments composing the life circumstances of Bennington alumni during the period of measured changes in attitudes. Social environments function conceptually as an explanatory link between attitude development in college and attitudes 20 years later. That is:

> large changes during the college years were likely to have been accompanied by a reorganization of important values sufficiently extensive to support persistence. It was further assumed that this new value system would be important enough to influence post-college interests, jobs, community participation, and the choice of friends, including those from whom husbands were selected. If so, these students would tend to create for themselves a social environment which would nurture and reinforce the value systems with which they left college (p. 53).

Using methods of analysis similar to those utilized by Trent and Medsker, four change groups were distinguished (remained conservative or non-conservative; became more or less conservative) and paired with factors of social support in the form of chi square tables. Social support factors included the degree of husbands' conservatism, the degree of friends' conservatism, and self-reports of interests and influences.

Lehmann and Dressel (1963) pursued, as we have noted above, a procedure of analysis which (1) identified "change" groups, (2) identified factors predisposing

change which took place during the study period, in this case the college years, (3) identified experiences and environments during the study periods which theoretically influenced on-going change and types of change, and (4) statistically related predisposing and facilitating factors to change in psychological dispositions (where in this instance, as in the two previous examples, chi square was employed).

Two broad categories of psychological disposition--value orientations and stereo-typic beliefs--were measured both at the beginning and end of the freshman year. At the end of both the sophomore and junior years, random samples were given the battery of tests. At the end of the senior year, the same battery was administered to the total class still enrolled.

In order for a student to be considered a "changer" his actual post-test score had to be at least 1.5 standard deviations above or below his predicted post-test score. His predicted score was determined by regression analysis. Regression equations were set up separately for the attitude and value measures. In addition, since there were significant sex differences on both the pre- and post-tests, separate regression equations were computed for males and females. Three groups of students were thus identified: those who changed in a positive direction (determined a priori), those who changed in a negative direction, and those who did not undergo a true change in terms of deviating from predicted post test scores. Thus, unlike the aforementioned studies, Lehmann and Dressel, in assessing factors associated with change, built into their analysis an attempt to control for both initial levels of values and beliefs and "normally expected" degrees of change.

Predisposing or biographical characteristics selected for study were; locale (size of home community), type of secondary school attended, size of high school

attended, size of high school graduating class, level of father's education, religious affiliation, level of mother's education, and father's occupation. College environments and experiences proposed as prominent factors bearing on personality development were: instructors, courses, social activities, cultural activities, dormitory life, fraternity or sorority membership, conformity, rules and regulations, living away from home, and friends. Biographical data were collected through standard survey procedures. College life data were gathered from in depth interviews. Students were requested to discuss their various college experiences which they felt might have modified or reinforced their perspectives on life. In addition to learning what experiences had an impact, each interviewee was asked to rate the degree of impact of each experience (from a list formulated in advance, as described earlier in this paragraph) on a scale ranging from no impact (0) to very much impact (4).

Katz and associates introduced chi-square analyses of the extent to which self-understanding, peer relations, family situations, and ideas are perceived to have caused changes in personality during college. Change was neither operationally specified nor measured. The analyses did not attempt to relate change-inducing factors directly to the magnitude of change. A wealth of impressionistic data from interviews in which students attributed cause-effect to a variety of influences on whatever changes or growth they have perceived in themselves during college constituted the bulk of material regarding determinants of change.

Strategies for Determining the Student Pursuit of Educational and Vocational Careers

Several dimensions of student careers were conceptualized and operationalized among the studies under review. Educational aspirations were--generally conceived as the highest grade or educational level which students perceive as desirable.

Educational plans, to be distinguished from aspirations, were generally concieved as the degree to which realistic decisions and concrete actions specific to those decisions had been asserted on the studies' subjects. Both dimensions are indicative of students projecting themselves into future career-roles on the basis of present needs, knowledge, and influences. Typically, educational aspirations and plans among high school students and, to a lesser degree, college students were not formulated beyond the notions of attaining a college degree (or some other specific level) and field of major. Indeed, measurement with respect to these concepts was primarily focused on the level of attainment. Measures of aspirations and plans, then, anticipate rather than describe career patterns, and oversimplify the normal complexity of educational careers. However, granted a high level of generality, educational aspirations and plans may be useful in predicting educational career patterns, in which case the motivational significance of these dimensions is well suited, either as independent or intervening variables. As dependent variables, as indicators of career pursuits, however, these measures are of limited value.

Vocational aspirations and plans are similarly affected by premature anticipation and, subsequently, by a paucity of descriptive complexity. Moreover, as predictors of vocational careers, vocational aspirations and plans are ineffective for many students except, perhaps, for broad classifications of occupational level (e.g., professional, white collar, and blue collar).

Achievement was a pervasive theme in the studies under review and constitutes, certainly, one critical dimension about which student career pursuits may be adumbrated. Achievement may be further refined into at least three subdivisions: (1) task mastery, (2) status, and (3) intrinsic satisfaction. With respect to educational achievement, the studies emphasized the first of these--task mastery, or the assimilation of knowledge and cognitive skills. Much less

emphasis was devoted to satisfaction with one's educational career. The pursuit of and command of social status as a facet of student career development was not dealt with in any case. In analyses of student career pursuits, achievement measures were employed variously as "effects" (e.g., cognitive learning as a function of school characteristics), "causes" (e.g., achievement or ability in high school as predictors of persistence in college), and intervening conditions (e.g., satisfaction with high school experience mediating a relationship between Socioeconomic Status and college attendance). Occupational achievement received only minor attention, with particular focus here on job satisfaction.

Entry into and persistence in reaping the advantages of increased career opportunities were also a topic of concern. Matriculation into college, persistent work toward and completion of the degree during a four year period, entry into graduate school and persistence in obtaining advanced credentials, recruitment into responsible occupational positions and job promotion stand out as inclusions in several investigations selected for review.

Still another dimension of student career pursuits emerged from the studies under review. We refer to the decision-making process related to career choice. Problems and conflicts surrounding decisions over college and occupational careers were proposed; the extent to which decisions are influenced or arrived at by someone other then the student himself were tapped; and key decisions identified. Problems and conflicts included incongruities between actual and required grades, rejections from preferred colleges, choice of major, emphasis on broad, liberal arts education or on vocational training, choice of college, choosing between employment and college, and rejection of applications for desirable employment. Parents, peers, and counselors were among those persons whose participation in the decisions bearing on student careers was investigated. The key decisions

posited included when to enter military service, when to apply for a permanent job, when to get married, which college or vocational school to attend, what curriculum to emphasize, and what jobs best suit one's interests and needs.

While theoretical work in vocational development has proliferated an enormously complex network of concepts linking socialization and education to self-concept, and self-concept in turn to role testing and decision-making, the research being analytically reviewed falls short of operationalizing and empirically validating these complexities. Trent and Medsker (1968) utilize chi square tables and Z ratios relating a series of predictors to three post high school pursuit groups (college persisters, withdrawals, and non-attenders), with controls for sex, socioeconomic status and academic aptitude applied. Multivariate analyses directed at explaining or interpreting the temporal and causal connections among the predictors were not attempted although they were under taken subsequently as indicated in a current publication (Trent, 1970) and explained more definitively in a forthcoming publication (Trent). Among the predictors are measures of parental encouragement to attend college, ability, attitudes toward high school experiences, study habits, educational goals and values, parental temperament, and attitudes toward college faculty and administration.

Thistlethwaite (1965) pursued an analysis stratagem which included the following steps: (1) Groups of college students were identified as to whether they aspired to enter, enter after some period of delay, or not to enter graduate training. Aspirations were measured at the time of matriculation, after the second year of college, and upon completion of the senior year. Actual entry was determined immediately following graduation from college. (2) Reasons for deciding against graduate training were assessed separately for men and women in terms of the proportions of students identifying lack of motivation to do graduate work, family responsibilities and financial obstacles, lack of academic

qualifications, and military obligations. Data recording attempts to obtain financial assistance and attempts to apply for graduate school admission were appraised with reference to those students claiming financial obstacles and lack of qualifications as reasons for non-entry. (3) Several pre-college characteristics were employed as predictors of aspirations, on the one hand, and the entry criterion on the other. Multiple correlation techniques were used in order to demonstrate how well each of the two criteria could be predicted from each pre-college predictor and from an optimal combination of these predictors. The eight characteristics were sex, aspiration level upon matriculation, National Merit Scholarship Qualifying Test scores for high school seniors, father's educational level, mother's educational level, number of freshman scholarship applications during the first year of college, family financial resources reported initially, and probable major field of study reported upon matriculation. (4) Changes in aspirational levels from freshman to junior to senior years were reported in terms of proportions of students who "decided" during high school, first or second year in college, or third or fourth year in college; also in terms of sex, aptitude scores, and major field of study. (5) Finally changes in dispositions toward graduate study were related to lower and upperclass college environmental factors (resultants of a factor analysis of a large number of college environmental characteristics), controlling for the effects of the eight pre-college characteristics noted above.

The method advanced for controlling pre-college characteristics consisted of a series of multiple regression equations developed for predicting both criteria (aspirations and entry) from these eight predictors. Residual scores (discrepancies between actual and predicted criterion scores) were used as the principal dependent variables, and are referred to as adjusted criterion measures. These measures may be interpreted as indices of the extent which each

student changed his motivation for advanced training beyond those changes predictable from his 1959 (pre-freshman) status on the selected pre-college variables.

In No Time For Youth, Katz and associates (1968), included a single chapter whose principal purpose was to demonstrate some of the "contradictory and often unfair alternatives" confronting college students concerned with deciding upon career paths. Their strategy featured three areas of analysis: (1) congruence between freshman occupational choice and choice of major field, (2) the degree to which participation in any given major field leads to post-college activities related to college training, (3) the degree to which graduate training matches freshman occupational choice. The analyses of career choices were limited to professions normally requiring graduate training. Simple frequency and percentage distributions were used throughout. Although tests of significance were not systematically reported, the analysis theme--early occupational choice to appropriate choice of major to post-graduate specialization--was further elaborated in terms of the ability levels (grade point averages and SAT scores) of continuing graduate students as opposed to employed college graduates. Moreover, among continuing graduate students, those pursuing studies related to their freshman occupational choice were compared to those pursuing unrelated studies with respect to scores obtained as freshman on the Strong Vocational Interest Blank. Separate analyses for men and women were presented.

Astin and associates (1963, 1969) have employed analyses paralleling Thistlethwaite's (1965) efforts in appraising the independent impact of college environmental factors on vocational choice and motivations to obtain advanced degrees. That is, an "input-output" strategy utilizing multiple regression techniques to exhaust the predictive power of student background characteristics with

respect to the criterion variables permits "controlled" prediction on the basis of subsequently introduced college environment variables.

Several objections to the use of this method have been noted in the literature.[3] Most obvious are the difficulties of finding all the relevant antecedent (input) variables one wishes to control. The use of residual scores (discrepancies between scores predicted on the basis of input characteristics and actual scores) may be confusing and unreliable and subject to errors of various sorts. In addition, the input-output model assumes no interaction between input and environmental factors, which results in attributing to input characteristics both their independent effect and their joint effect (through an association with environmental factors), thus reducing artificially the proportion of the residual variance left to be explained by the environmental factors.

Interaction effects together with the use of multiple correlation techniques also may result in artificially inflating the coefficients of input variables where associated environmental factors have been held out of the analysis, as is the procedure in computing residuals.

Finally, regardless of interaction between input characteristics and environmental variables, the input-output model fails to manage adequately the possibility that relationships between inputs and criterion variables may be specified under varying environmental conditions. This may mean, for example, that controls for socioeconomic status and ability may well allow inferences as to the effects of a pre-medical program on vocational plans but may have little relevance for isolating the independent effects of a social science program on the same criterion.

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[3] Feldman and Newcomb (1969), Richards (1966), Wheeler (1966).

Project SCOPE (Tillery, et al) ennumerates an analysis strategy featuring a multivariate analysis of variance designed to provide (1) a multivariate F statistic for a cluster of conceptually related dependent variables and (2) univariate F statistics for each dependent variable. These two types of F statistics will be produced for the three main inputs--four levels of educational aspiration, four levels of socioeconomic status, and two levels of race (Caucasian and non-Caucasian); and for four interactions--educational aspirations-socioeconomic status, educational aspirations-race, socioeconomic status-race, and educational aspirations-socioeconomic status-race. Criterion variables include attitudes about school and college, academic behavior, academic achievement, problems and conflicts related to career choice, and career-related decisions.

Super and associates (1967) have formulated a rather straight-forward scheme in which correlations relating each predictor variable to each criterion variable are produced. Predictor variables cover such conceptual areas as vocational maturity, correlates of vocational behavior in junior and senior high school, as well as selected background characteristics. Criterion variables included occupational behaviors and outcomes.

Some Further Considerations

The lack of attention devoted to the effects of student-institution interactions in the studies reviewed is disappointing. Several studies measured both institutional and student background characteristics but pursued an analysis which sought the impacts of school factors independent of student backgrounds, employing student characteristics as controls. A specification of what kinds of students in what kinds of school environments exhibit what kinds of outcomes was within reach but left relatively unreported (and, we assume, unanalyzed).

In a longitudinal study of adolescent boys, Bachman and associates (1970) have, however, delineated a strategy for examining the effects of "person-environment" interactions on criteria variables, though actual data at the time of this review had yet to be reported. Various combinations of person and environmental characteristics are conceptualized in terms of "goodness-of-fit" from which two major areas of analysis are contemplated: (1) the matching of abilities with school and/or job requirements, and (2) the matching of motives with school and/or job opportunities for motive gratification. Their intention is to assess some of the fits between abilities and requirements, and then to assess the relative importance, of this fit as a predictor of the criteria. Also, they are interested in examining the optimal match between abilities and requirements and in learning whether this match is essentially the same for all criterion dimensions. It was expected that a "good fit" in terms of one criterion may be a poor fit in terms of another.

In developing categories of person-environment fit, the researchers plan to determine in advance which dimensions of persons are likely to interact with characteristics of environments. Among the ability measures of individuals, intelligence and reading ability are contemplated as central to the analysis. Among the motive variables, need for achievement, need to avoid failure, need for self-utilization are stressed. Criteria include measures of satisfaction with education, self-development, and self-utilization. Correlational statistics both within cross-sectional and longitudinal designs will be applied.

STATISTICAL PROCEDURES

The statistical procedures used in the studies described in this report include many standard techniques of analysis as well as some innovations. The standard techniques are summarized and briefly described as follows:

Descriptive Statistics:

Frequency distributions. For each possible value of an observed variable the percentage and number of subjects in a sample having this value is calculated.

Sample means. The arithmetic sum of the values of a variable observed in a sample divided by the total number of subjects in the sample.

Sample median. The point such that for a given sample half the values of the observed variable are greater than or equal to it and half the values of the observed variable are less than or equal to it.

Sample standard deviation. Let $\bar{X}$ denote the sample mean of N observed values of a variable X. Then the sample standard deviation is the square root of all quantities of the average form $(X_i - \bar{X})^2$ as i runs over the range of N observations. The sample standard deviation can be thought as a measure of the amount of dispersion in the sample.

Variable cluster analysis. A procedure which takes a set of observations on a number of different variables and attempts to group the variables into clusters which contain those variables which are "close" to each other according to some arbitrary measure of distance (e.g., the ordinary Euclidean metric).

Object cluster analysis. Similar to the preceding procedure except that subjects are grouped according to their measurements on a specified set of variables.

Parametric Estimation and Hypothesis Testing

Sample product-moment correlation. A measure of linear association between two variables. Let $X_1, X_2, \ldots, X_n$ and $y_1, y_2, \ldots y_n$ denote n pairs of observations on variables X and y. The product-movement correlation coefficient is computed as the average of all quantities of the form

$$(X_i - \bar{X})\ (y_i - \bar{y})$$

divided by the product of the two sample standard deviations.

Auto correlation. A product-moment correlation coefficient calculated on the observations of a variable taken at two different times.

t-test. A statistical test of the hypothesis that a population mean is equal to some specified value, or that the means of two separate populations are equal.

Univariate analysis of variance. A statistical procedure which allows the testing of various hypotheses about all means in a table of observations. For example, a one-way analysis of variance is a generalization of the t-test to the problem of testing the equality of several population means.

Multivariate analysis of variance. A generalization of univariate analysis of variance to the case in which several variables are observed rather than just one.

Multiple linear regression. A statistical procedure which estimates the best linear predictor of a dependent variable using observations on a set of independent variables.

Stepwise multiple linear regression. A multiple linear regression procedure in which the independent variables are introduced one at a time.

Analysis of covariance. A statistical procedure which is a combination of linear regression and analysis of variance. It enables management of problems involving various combinations of interval and nominal scales.

Correlation ratio. The square of the standard deviation of the average value of a dependent variable when an independent variable is given divided by the square of the standard deviation of the dependent variable. This statistic can be used to test the hypothesis that a linear relationship holds between two variables.

Partial correlation. The correlation between two variables when the values of other variables are held constant.

Part correlation. The correlation between a variable X and the residual after the regression of a variable Y on a set of independent variables.

Discriminant analysis. A statistical procedure which, given several groups of subjects and observations for each subject in each group on a set of variables estimates equations which best discriminate between the groups. Given a set of observations on an individual whose group membership is not known, it is possible to use these equations to classify him.

Canonical correlation. A procedure which is concerned with correlations between two sets of variables.

Nonparametric Estimation and Hypothesis Testing

Rank order correlation coefficients (Spearman-Kendall's). Correlation coefficients between two variables when the actual values of each variable are replaced by the ranks of those values within each set of observations. Frequently the rank ordering is what is actually observed.

Analysis of variance on ranks. The analysis of variance procedure described above applied to the rank values of the observations on a variable.

Chi-square. A general test which can be used whenever one wishes to evaluate whether or not frequencies which have been empirically obtained differ significantly from those which would be expected under a certain set of theoretical assumptions.

Psychometrics

Factor analysis. An omnibus term referring to a variety of procedures which have as a general goal the simplification of the inter correlation structure of a set of variables.

Measures of the speededness of a test. The percentage of students completing the test in the time allowed, also, the percentage of items completed in the time allowed.

Reliability coefficients. Correlation coefficients which attempt to measure the stability of a test in repeated observations or the compatability of two halves of a test. A number of different measures have been employed including the Angoff formula 16, Kuder-Richardson formula 20 and 21 which were used in the studies under consideration.

Correction for range procedure applied to reliability coefficients. A procedure which alters a reliability coefficient computed from one sample in the light of the possibility differing range of observations of a second sample to which it is to be applied.

Correction for attenuation applied to correlation coefficients. A procedure which alters a correlation coefficient in the light of the reliability coefficient of the test under consideration. Examples of these standard statistical techniques are indicated in the discussions of the studies under consideration.

Innovative Procedures:

Multiple Classification Analysis (MCA) and Automatic Interaction Detector (AID) (see Bachman et al, 1970). A method for approximating the unique effects of predictors which are categorical. Approximates regression analysis employing "dummy variables." Analysis of variance is used.

Sample Estimation. A clever technique for estimating the size of the simple random sample equivalent of the study sample (see Husen, 1967).

Estimated Correlation With Missing Data. A procedure for obtaining consistent (Gramian) correlation matrices and for estimating product moment correlation coefficients in the presence of missing data (see Shaycoft, 1967).

A system of weights devised to match test groups with respect to their sources on a measure of Abstract Reasoning Ability (see Shaycoft, 1967).

A ratio estimation procedure for estimating population parameters (Coleman, et al., 1966).

These procedures, too, are indicated in the discussion of individual studies.

Sampling.

Stratification and clustering are widely used with both cross-sectional and longitudinal designs. Not all the samples are probability samples. Non-response frequencies are included for the most part; however, in only a few cases are adjustments made for possible or likely biases. Sampling errors are estimated in Youth in Transition through use of a design effect procedure and in International Study of Achievement in Mathematics by use of the technique mentioned in the section on innovative procedures. In Equality of Educational Opportunity sampling errors are estimated by use of a random group method, which randomly distributes the observations of a variable x into mutually exclusive and exhaustive categories by using a sample design similar to that used for drawing the sample.

The relative effectiveness, applicability and expediency of the different sampling methods and statistical treatments in the present context will be considered in subsequent reports.

PROJECT PROCEDURES

The Analytical Review Project is concentrating efforts within four task areas: (1) evaluations of conceptualization, design, and methodology; (2) development of theoretical models related to several critical problems concerning student growth and development; (3) classification, organization, and synthesis of findings and variables within these theoretical frameworks; and (4) in-depth interviews of principal investigators emphasizing hindsights with regard to conceptualization, gaining access to target populations, data collection, and validity. Immediately following are outlines of these projects' culminative outputs, criteria for evaluation, and scheme for drawing upon the experiences of involved researchers. Subsequent sections treat the development of synthesis models and the classification of variables.

Project Reports

I. Report on Evaluation:

- A. Background and purpose of Analytical Review Project
- B. Methodology, including
  1. Criteria and procedures in the selection of studies under review
  2. Development of criteria for use in evaluation
  3. Criteria used in evaluation
- C. Summary descriptions of studies
  1. Types of research problems (e.g., interactions of institutional and student factors)
  2. Types of sample designs
  3. Types of methodology
  4. Types of statistical applications
  5. Types of instrumentation

D. Evaluation of special features on problems regarding:

1. Conceptualization and operationalization
   a. Dependent variables
   b. Independent variables
   c. Interaction effects
   d. Problems in making policy inferences
2. Sampling
3. Method of analysis
4. Application of statistical tests
5. Measurement
   a. Validity
   b. Reliability
   c. Economy, expediency, and utility

E. Administration of longitudinal research projects

1. Invasion of privacy
2. Gaining access
3. Maximizing response
4. Feedback and development

F. Recommendations

1. Needed research
2. Methodology
3. Measurement

G. Appendices

1. Annotated bibliography of 40 studies screened for inclusion in the Analytical Review Project
2. Summary descriptions of each individual study under review

II. Supplementary Report on Measurement

A. Conceptual classification of scales and items

B. Copies of instruments, including

1. Evidence of reliability

2. Evidence of validity

3. Ease of administration

4. Instrument Methodology (i.e., how the instrument was constructed)

C. Status and availability of data banks

III. Supplementary Report on Findings

A. Presentation of theoretical models

B. Development of classification categories

C. Classification and organization of findings

D. Validity of findings

E. Congruence of findings

F. Areas for new or continued research

G. Reformulation of theoretical models based on accumulated findings

Criteria for Evaluation

Initial thinking regarding criteria for evaluation has been completed in draft form and distributed to the National Center for Educational Statistics. This rather complex list of criteria was developed for the purpose of imposing guidelines in structuring our approach to evaluation. A summary of criteria follows.

I. Conceptualization and Operationalization

A. Dependent variable(s)

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4. The degree to which interactions are woven into a systematic framework.
5. The degree to which operationalized versions of test factors (intervening variables) preserve the conceptual clarity of theoretical notions advanced.

D. Hypotheses

1. The degree to which tested hypotheses explore the subject areas implied by the research problem.
2. The degree to which tested hypotheses allow logically or theoretically valid inferences as to causation.
3. The degree to which the many hypotheses are related to each other, providing cumulative evidence with regard to a central argument.
4. The degree to which operationalized versions of the hypotheses preserve the conceptual clarity of the working hypotheses.

II. Design

A. Sampling

1. The degree to which relevant and identifiable target populations have been incorporated into the sample.
2. The degree to which the sample size is adequate to the requirements of the analysis.
3. The degree to which the sample is a random representation of the study population.
4. The degree to which biases (i.e., non-response and sampling error) affecting the sample have been corrected.
5. The degree to which the complexity of the sample design meets the requirements of the research problem, population characteristics, and measurement.

B. Data collection

1. The degree to which the number and timing of longitudinal pre- and posttests are appropriate to the requirements of the research problem, population characteristics, and measurement.
2. Effectiveness in data collection techniques (cover letters, follow-up letters, obtaining authorization, etc.).
3. The degree to which pretest and posttest data result in complete data sets (i.e., problems of missing data).
4. The degree to which sample attrition was minimized in longitudinal research.

III. Methodology

A. Analysis

1. The degree to which alternative tests of hypotheses are provided.
2. The degree to which direct and indirect arguments are tested.
3. The degree to which maximum use of the available data was asserted.
4. The degree to which controls for external factors are applied (e.g., changing social-political climates, normal maturation, etc.).
5. The degree to which controls for self-selection are applied.
6. The degree to which artifactual distortions of change are controlled or taken into account (e.g., regression effects, "halo" effects, ceiling effects, etc.).
7. The degree to which multivariate analyses are inadequately applied or incorrectly used.

B. Statistics

1. The degree to which underlying statistical models (assumptions and decisions) are appropriately used.

2. One minus the probability of making a Type II error (power of the test).
3. Problems in making inferences associated with various statistical techniques.

IV. Measurement

A. Construction of instruments

1. The degree to which an instrument measures a single dimension.
2. The degree to which statistical or methodological techniques used in constructing an instrument are appropriate.
3. The degree to which the demension measured by the instrument has been properly identified.

B. Conceptual clarity (validity)

1. The degree to which given scales or items adequately measure the concepts called for in the theoretical framework of the study.

C. Administration

1. Speededness (i.e., timing and pacing)
2. Ease of administration
3. Scoring and interpretation
4. Examinee appropriateness
5. Norming

D. Normed technical excellence

The above criteria are presented in generalized terms. Many of the operational details have been listed in the Working Document. Nevertheless, the scope of this project, and perhaps of the task itself, does not permit a religiously detailed, standardized rating. Moreover, problems of feasibility, forseen and unforseen,

which normally pervade (and hinder) social science research reduce the justification for "precise" measurement of research effectiveness and efficiency. Thus, our purpose for forwarding criteria categories is to impose an overall structure to evaluation without decreasing the options of a creative evaluator. Of course, many specific evaluation criteria will be made explicit as evaluation progresses.

Interviews of Principal Investigators

Several topics will be pursued in interviews with principal investigators. A universal characteristic of long term, large scale research projects is that conceptualization and operationalization of research problems undergo modifications. Modifications are generated by interdisciplinary tensions, practical exigencies arising from data collection and measurement problems, evolution of ideas among staff members, and the realities of the data. Rare indeed is the researcher who is totally pleased with his final conceptualization and methodology. Hindsight as to what would be done given a second opportunity can be a rich source of ideas sensitive both to the complexities of research operations and data analysis.

Frequently, researchers proffer findings and conclusions urging their tentative status. Thorough review of the literature, practical experience with measurement instruments, and thorough knowledge of the weaknesses of one's methodology and statistical treatment induce misgivings concerning the validity of data and findings. Seldom are these misgivings communicated in published form since most social scientists accept the imprecision of their art, prefering to demonstrate tendencies in their data as imperfect increments of knowledge, fully expecting increased precision and replication in future research. Considering the state of the art, most social scientists as well as knowledgeable laymen can live with the tentative nature of knowledge to date. However, an accounting of just what is valid or invalid, firmly established or tentative about a body of findings would be of great value in formulating new directions for research. Principal investigators having

had to grapple with such questions during the course of their research, may be able to provide us, through hindsight, with this kind of sophistication.

Most important, however, are the contributions we might receive regarding the most practical facets of research: gaining access to a study population and obtaining responses from sample members. For a variety of reasons, social science researchers have encountered increasing difficulty in gaining the confidence of those persons to whom research is directed. Insuring anonymity, receiving authorization from appropriate officials, engaging the cooperation of sample constituents and liasions are no mean tasks, requiring high degrees of administrative skill, skills which often must be improvised for lack of foresight and initial blunder. The hindsights of our principal investigators on these matters may prove useful to researchers following in their footsteps.

Interviews will be structured in advance by developing interview schedules keyed to the particular circumstances of each research project. Interviews will be conducted by telephone where possible, otherwise in face-to-face meetings. Finally, principal investigators will be encouraged to react critically to the efforts of our staff, their comments and suggestions being incorporated into our final report.

DEVELOPMENT OF THE THEORETICAL MODELS

In struggling with a focused conceptual scheme for relating the immense diversity of input, process, and contextual variables to such an all-encompassing dependent variable as "student growth and development," it became apparent that a problem-oriented theoretical framework or "model" would be useful in establishing proto-types for synthesizing variables and findings. Such a model, however, could only be formulated at an unrealistically high level of generality, and even then with considerable reservation. Thus early in our thinking, a decision was made to settle on a limited number of "problems," important both to academicians and policy makers, for which "middle range" theoretical models could be constructed. Such models would not only serve as a heuristic device in synthesizing and reporting our data, but also as an independent source of research sophistication, innovation, and, practical application.

The "problems" tentatively selected are (1) patterns of college flow, that is who does and does not attend institutions of higher education, why and on the basis of what sequence of decision points; (2) vocational development, the development of perceptions and values and the sequence of decision points leading to different vocational plans and pursuits; (3) intellectual development, including the growth of intellectual capabilities and skills during preschool and elementary school years which serve to provide a basic foundation for successful competition at the high school and college levels; and (4) socio-psychological development, including the acquisition of orientations, attitudes, and values which may assist responsiveness to educational programs and environments.

Each model will delineate (a) key variables, (b) the temporal relationships between the key variables, and (c) intervening variables and interactions mediating the main arguments indicated by the conceptualizations and data related to the models. Since the primary purpose here is classificatory, the models will attempt to be comprehensive. Thus theoretical arguments cannot be refined in all aspects to the Nth degree. The intent, rather, is to (1) formulate a single, major set of propositions incorporating the relevant key variables; (2) elaborate these propositions by specifying important interactions, including interactions among the models; and (3) to specify multi-directional relationships between all selected variables. An example of such a model related to patterns of college flow is offered here.

Objectives of the Model for Patterns of College Flow

Why do some high school graduates continue their education in some institutions of higher learning, others choose to enter the work force immediately and permanently, while still others elect to postpone a higher education for several years? Among those who continue their education, what influences their selection of types of institutions? These are some of the issues to which this model is addressed. Explanations are sought in the experiences, opportunities, motivations and abilities of high school students.

Theoretical Framework

Three key concepts or variable sets are posited: 1) high school performance, 2) high school educational opportunities and experiences, and 3) the pre high school socio-economic, educational and general environmental background of students affording differential "life chances" and values. High school performance includes all the criteria assessed by college admission committees (grades, conduct, extra-curricular activities, leadership, etc.) as well as characterological factors related to "maturity." Educational experiences and

opportunities range from facilities and curriculum, to faculty characteristics, to classroom techniques and dialogue, to peer-shared academic concerns. Background factors include primarily socio-economic status and perhaps most particularly the educational background and related values of parents. In addition, the socio-economic and other environmental characteristics of the communities, and neighborhood in which students reside apply here. These three complex concepts are temporally defined in their relationship to the dependent variable, college flow. High school performance is most proximately related to college entrance. Educational opportunities and experiences relate to college flow by exerting a critical influence on attitudes toward education and performance. Finally, background factors underlie the entire dynamics of patterns of college flow in as much as educational opportunities and experiences and environmental "conditioners" are differentially distributed throughout society along social class lines, thus "pre-determining" the chances that a student will perform well in high school and eventually expect and aspire to a college education. The argument thus far expresses the common experiences of teachers, administrators, and researchers alike. Figure I illustrates this:

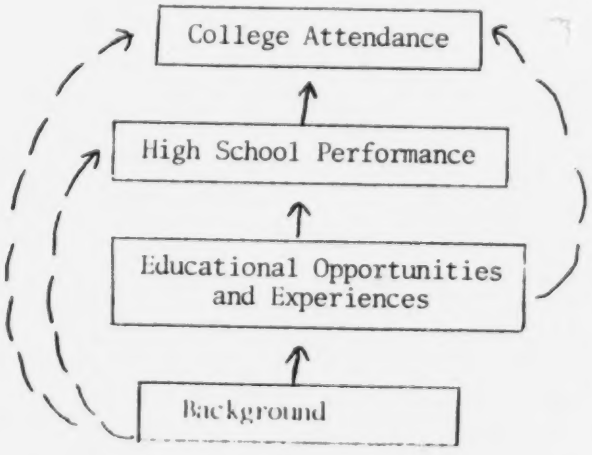

Figure I. Principal elements of college flow model.

The model thus far is oversimplified. Many students, though perhaps a relatively small minority, who perform well in high school do not find college an attractive alternative. Even greater proportions of students having enjoyed superior educational opportunities fail to perform well in high school and to achieve post-high school educational status. And, of course, social status background, despite relatively high correlations to college attendance, is far removed from caste-like restrictions on mobility and, taken alone, suggests little in the way of programmatic change.

Therefore intervening factors which mediate and interact with the basic argument are of interest, both for reasons of improving the predictive power of the model and elaborating how and why the basic argument appears generally true. The concepts of aspiration and expectations mediate the relationship between high school performance and college attendance.

Though aspirations and expectations may either precede, coincide with, or follow high school performance in time, they form a pervasive psychological construct, in which on the one hand, emerging aspirations and expectations stimulate an awareness in the student of the relationship between performance in high school and college attendance. On the other hand, high school which tests one's performance success, tempers, aspirations and expectations. In addition, aspirations and expectations may vary independent of each other so that aspirations may exceed, match, or underplay expectations.

Rather than speaking of a relationship between high school performance and college attendance, then, we speak of a complex interaction of high school performance, aspirations, and expectations with consequent impacts on college flow. Aspirations are educational (and occupational) desires, goals, values, and plans. Expectations are practical considerations with respect to the financial, geographical, social, and psychological <u>accessibility</u> of higher education (or the work

world). The interactions, again, involve: 1) the impacts of aspirations and expectations on high school performance and vice versa; 2) the relationship between aspirations and expectations; and 3) the mediating impact of aspirations and expectations on the relationship between high school performance qualifications and recruitment into college (or non-college) ranks. This portion of the model is illustrated in Figure 2.

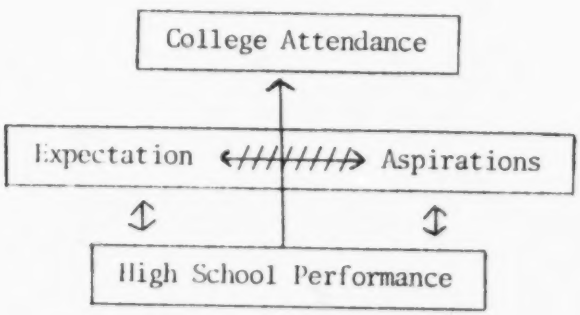

Figure 2. The relationship between college attendance and high school performance, mediated by aspirations and expectations. (Double-headed arrows indicate interactions and the graph bar indicates the mediating impact of both expectations and aspirations on the relationship between performance and college attendance.)

The relationship between educational opportunities and high school performance is mediated by intellectual and social capabilities (motivations and skills). Thus, given a student's educational opportunities and experiences, his subsequent performance will be shaped by his response to those opportunities; that is, the degree to which he is motivated and able to convert learning opportunities and experiences into achievement and growth. To an important extent, intellectual and social capabilities bear some unique influence on the educational opportunities and experiences to which students are exposed through "tracking," special schools, but especially through teacher records and responses to student behavior.

Also, educational opportunities are functions of community resources, ethnic background, social class and so forth, all factors external to the individual. On the other hand, educational opportunities and experiences, important sources of socialization in our society, have a decided impact on intellectual and social capabilities, though not exclusively as we will note later. Further, it is likely that intellectual and social motivations are interdependent.

Thus educational opportunities and experiences relate to high school performance, according to our model, in three major ways: 1) Given educational opportunities and experiences, the degree to which a student is intellectually and socially "prepared" to profit from them modifies the direct impact of opportunities on performance. 2) Educational opportunities and experiences tend to reinforce their direct impacts by socializing intellectual and social capabilities. 3) Educational systems respond to the intellectual and social capabilities of students, differentially providing increased opportunities to those with the "right" kind of capabilities and decreased opportunities to those with the "wrong" kind of capabilities.

Intellectual capabilities include general learning skills (reading, language comprehension, etc.), learned intelligence ("culturally biased" IQ scores), curiosity, creativity and faculty with abstract concepts. Social capabilities include orientations such as independence, sense of responsibility, cooperation; personality traits such as social maturity, self-esteem; and social skills such as sociability. Figure 3 illustrates the interactions comprising this portion of the model.

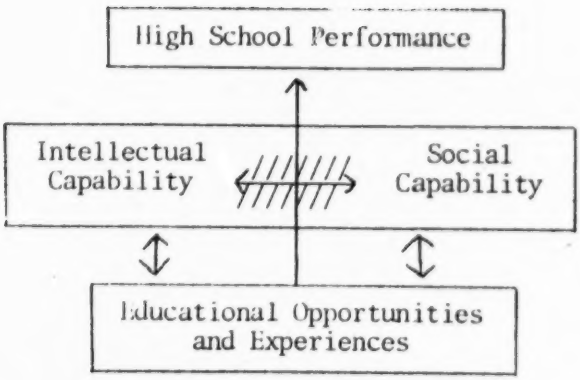

Figure 3. Relationship between educational opportunities and high school performance, mediated by intellectual and social capabilities.

While background factors such as socio-economic status are empirically associated with college attendance, we understand that the statistical relationship is a cumulative summary of differential opportunities, motivations, and role definitions. In addition to influencing directly the quality of educational opportunities and experience, socio-economic status, for example, exerts a profound effect on intellectual and social capabilities, and on aspirations and expectations with respect to post-high school roles. Thus, social class simultaneously influences, in complex fashion, three interdependent processes leading to college attendance: 1) the educational opportunities and experiences available to students, 2) the degree to which students are intellectually and socially prepared to take advantage if to extant opportunities, and 3) the degree to which social role definitions create a conscious need to perform well in high school so as to enhance college attendance.

The motivational and aspirational impacts of social class are accomplished largely through socialization. Two aspects of socialization are pertinent.

First, the transmission of role prescriptions, values associated with roles, how to creatively adapt to role conflicts, and identifying with certain role "models" (personages or reference groups) we may term, for lack of a better label at the present time, role identification. Second, the availability of cultural stimuli such as ideas, music, arts, and science in the home, peer group and classroom results in what we will term cultural repertoire. Also, the multitude of cultural stimuli reflecting one's material life style would fall under this category.

The relationship between aspirations, social capabilities and social class is a complex one involving 1) role identifications conducive to certain kinds of social capabilities, 2) role identifications conducive to certain kinds of aspirations, 3) a relationship between social capabilities and aspirations, and 4) a direct relationship between social class and role identification. Similarly, expectations and intellectual capabilities are related to social class through the development of cultural repertoires. This portion of the model is illustrated in Figure 4.

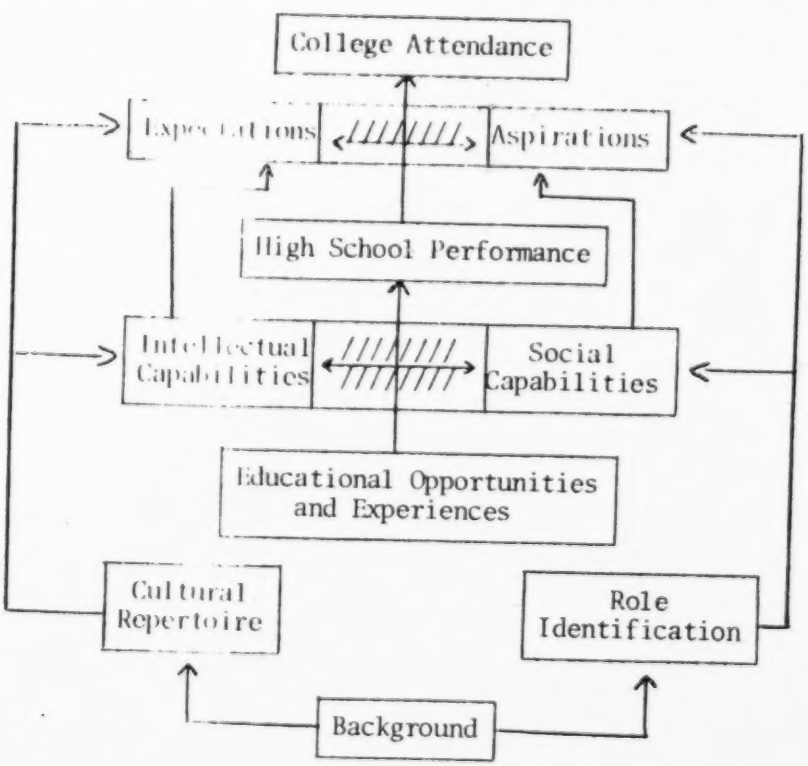

Figure 4. Relationship between background and educational opportunities, motivations to learn and [illegible]

Socialization vis-a-vis roles and exposure to cultural stimuli takes place in a variety of situations--the home, among peers, in the classroom, and for some high school youth, on the job. The quality of socialization as practiced in the school is embodied in the notion of educational opportunities and experiences. Thus cultural repertoire, role identification, intellectual capabilities, and social capabilities all are affected by educational opportunities and experiences (see Figure 5.).

Socialization occurring in the family, within peer groups and at work, while exhibiting differential patterns between social classes, depends on considerable variation in 1) cultural resources and 2) interpersonal relationships within social class. Thus, upper and middle class parents may be highly educated but vary considerable in such areas as intellectual disposition, cultural interests, and scientific acumen or interests.

The same may be true for lower class persons whose lack of college degrees does not necessarily reflect a lack of intellectual interests or musical and artistic tastes which they may acquire through family, ethnic traditions, and other sources. Moreover, the quality of interpersonal relationships within the socialization agency, especially in the family where relationships are intimate and compulsory, can determine the effectiveness of socialization. While adolescence is a period typically characterized by child-parent tensions, the closeness of personal bonds and influence on parents varies considerably.

Thus the relationship between social class and cultural repertoire is 1) mediated by the impact of actual cultural resources maintained by families, peers, and work groups. 2) Cultural resources are not distributed among these agencies independent of social class, though the dependence is far from perfect. 3) Cultural resources in the family may serve as standards for selecting voluntary membership into peer and work groups.

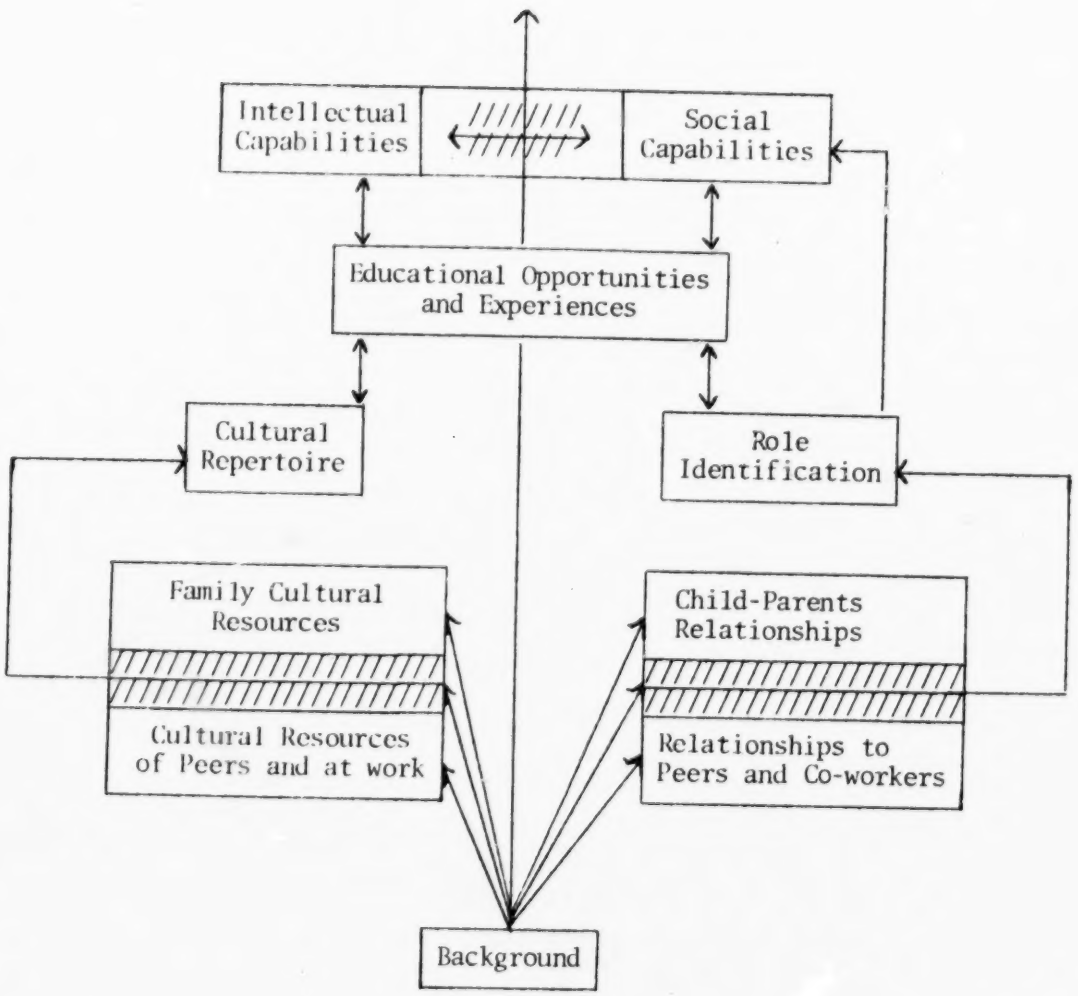

Figure 5. Relationships between background and 1) cultural repertoire, mediated by cultural resources available in socialization agencies and 2) role identification, mediated by interpersonal relationships in socializing agencies.

The relationship between social class and role identification is 1) mediated by interpersonal relationships between the student and his parents, siblings, peers, and co-workers. 2) The quality of interpersonal relationships differs somewhat between social classes, though much variation can be expected. 3) Interpersonal relationships within the family may influence the type of relationships established with peers (and at work). This portion of the model is illustrated in Figure 5.

Much of the preceding discussion has focused on the preparation, intellectual and social, required to compete and achieve in high school programs. We have stipulated three major factors related to such preparation: 1) educational opportunities and experiences, 2) cultural repertoires, and 3) role identifications. Each of these theoretical components together with social class identify probabilities of learning based on environmental advantages or disadvantages. At this point, we need to introduce an important dynamic into our model: the social and psychological implications of students behaving in response to these various interrelated environments.

Two components are proposed in this context. First, the degree of social-emotional support sanctioning a student's expression of cultural involvement, or response to a classroom problem serves to reinforce, or if negative, discourage additional behavior in the same direction. Second, the degree of intrinsic psychological gratification experienced in such activities as voicing an idea or opinion, playing a musical instrument, solving a challenging algebra problem, or performing before one's class also provides a dynamic incentive to continue behaving in similar directions.

Since we have specified "cultural repertoire" as a non-school variable (cultural repertoire is also implied by "educational opportunities and experiences"), we look to parents and peers (also employers and workers where relevant) as the appropriate agents of social rewards or punishments. Psychological gratification will apply to behaviors occurring in the home, on the playground, and, perhaps, at work. On the other hand, we look to teachers, administrators, and peers vis a vis their classroom roles as the appropriate agents of social support relative to behavior occurring in the classroom. Psychological gratification refers in this instance to school organized learning expe-

riences. Admittedly, the distinction between gratification and social support is a difficult one since both involve social conditioning. Perhaps we might conceive of gratification as internalized social support.

We must point out at this juncture that there often is not a clear division between non-school and classroom behavior. For example, discussion of homework or ideas may be thought of as an extension of classroom learning into the family dining room. Similarly, dinner table political discussions may become the basis for classroom participation.

Moreover, the concepts of social support and psychological gratification apply equally well to role identifications, since the process of learning, playing, and aspiring to roles involves verbal and non-verbal behaviors subject to social (extrinsic) and psychological (intrinsic) sanctions. Finally, social support from parents, teachers, and peers is likely to be differentially patterned according to the social status background of the student. Also, we might expect superior educational opportunities to include superior attention (support) on the part of teachers and administrators. Figure 6 illustrates.

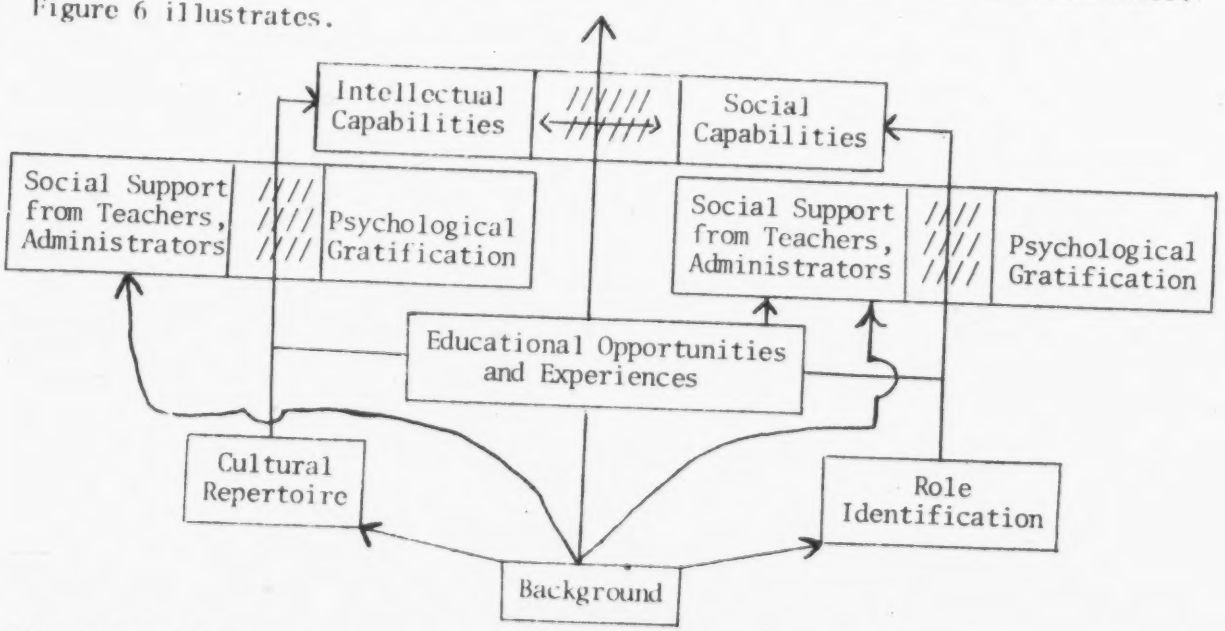

Figure 6. Relationship between educational opportunities, cultural repertoire, and role identification, on the one hand, and intellectual and social capabilities ("preparation for high school work") on the other, mediated by 1) social support for learning behaviors, and 2) psychological gratification associated with learning behaviors.

Critics of public education in the United States have frequently bemoaned a persistent strain toward middle class consistency which pervades the cultural and value orientations of teachers and administrators. Thus Chicano and black students often find their speech, dress, and behavior codes, commonly accepted at home and in the neighborhood; rejected and repulsed at school by white, middle class teachers and administrators. Indeed, many student-faculty and parent-faculty conflicts involve violations of long entrenched codes no longer appropriate to the business of learning.

The impact of educational opportunities and experiences in reinforcing or contradicting the cultural repertoire and role identifications which define the students' everyday life at home, then, depends so importantly on the degree to which family, peer, (and work) cultures and values are congruent with those promulgated within the school gates. Obviously, social class plays a crucial role both in determining non-school and in-school cultural transmission. This portion of the model is illustrated in Figure 7.

Finally, but by no means lastly, constitutional factors, especially sex and intelligence, are necessary requirements of our model. Just as the social class system stratifies opportunities and motivations, the sex-role has been and continues to be an important source of stratification. Women's liberation has highlighted the problem of "socialized oppression" yet the "revolution" in male and female attitudes toward sex-roles seems to be moving more along ideological lines among urban intellectuals than in broad-based legislation pressured by mass support. Thus, girls continue to be differentiated from boys in terms of "acceptable" social rules and coincidentally in terms of "appropriate" educational opportunities and experiences, although this situation may be changing beyond the ideological notions of society's intellectuals.

Social barriers to equal educational treatment of the sexes consist primarily of 1) stigmas or negative norms and sanctions applied to course selection and learning behavior, enforced by peers, parents and teachers alike, and 2) formal institutional policies regarding the segregation and rating of students based on sex. Stigmas and

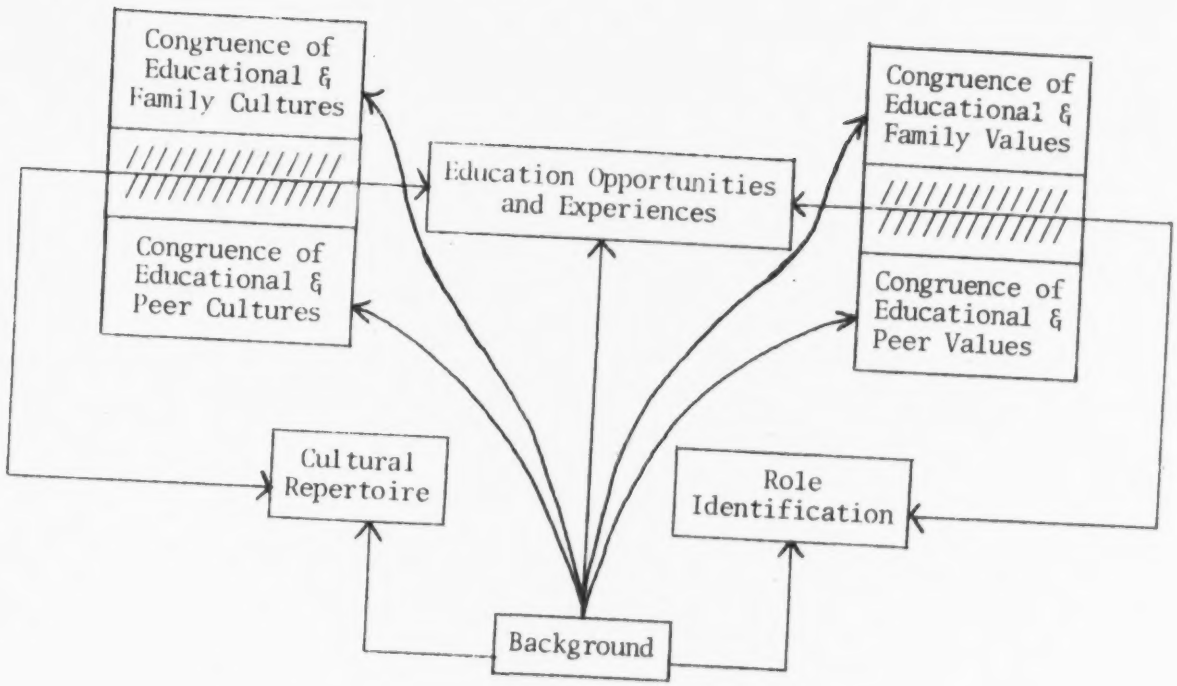
Congruence of Educational & Family Cultures
Congruence of Educational & Peer Cultures
Education Opportunities and Experiences
Congruence of Educational & Family Values
Congruence of Educational & Peer Values
Cultural Repertoire
Role Identification
Background

Figure 7. Mutual impacts of educational experiences, cultural repertoire, and role identification, as mediated by the congruence of non-school and in-school cultures and values.

policies, together with social class, vary substantially, of course, though in no simple pattern.

Other psychological and physiological factors come into play, mediating the stratification tendencies of social class and sex-role. Native intelligence is the most advertised of these, however misrepresented by "culturally biased" test scores. In addition, genetic or physical handicaps such as blindness, deafness, chronic heart ailments; or family health problems such as invalid parents and so forth may greatly affect individuals. Again, social standards and institutional policies serve to screen individuals where these factors are outstandingly visible. This discussion is illustrated in Figure 8.

Summary

The foregoing presentation, though sketchy throughout, places particular emphasis upon the intellectual and social preparation and development of students and the impact of educational opportunities and experiences on this development. The model poses an oversimplified argument which "predicts" college or non-college flow. The argument is then justified by an elaboration of factors which presumably 1) improve the predictive power of the principal argument by virtue of comprehensiveness, and, most importantly 2) provide the theoretical foundation for explaining why and how educational careers are advanced. Figure 9 illustrates the entire model.

The Model as a Basis for Integrating Findings

The model provides a theoretical framework within which empirical findings may be organized in relational terms. The relationships (or hypotheses) linking the model's member components may serve as categories or headings under which findings assume theoretical continuity. Moreover, the categories themselves are meaningfully interlocked within the context of the model. Thus, not only have we a method for synthesizing a wide array of empirical outcomes, we in essence advance an important step in identifying the significance of these findings in relationship to a developing theory. Ultimately, the model may be refined as the evidence accumulates. In the meantime, we are looking for persistent trends or replications in the data and areas where insufficient work has been accomplished

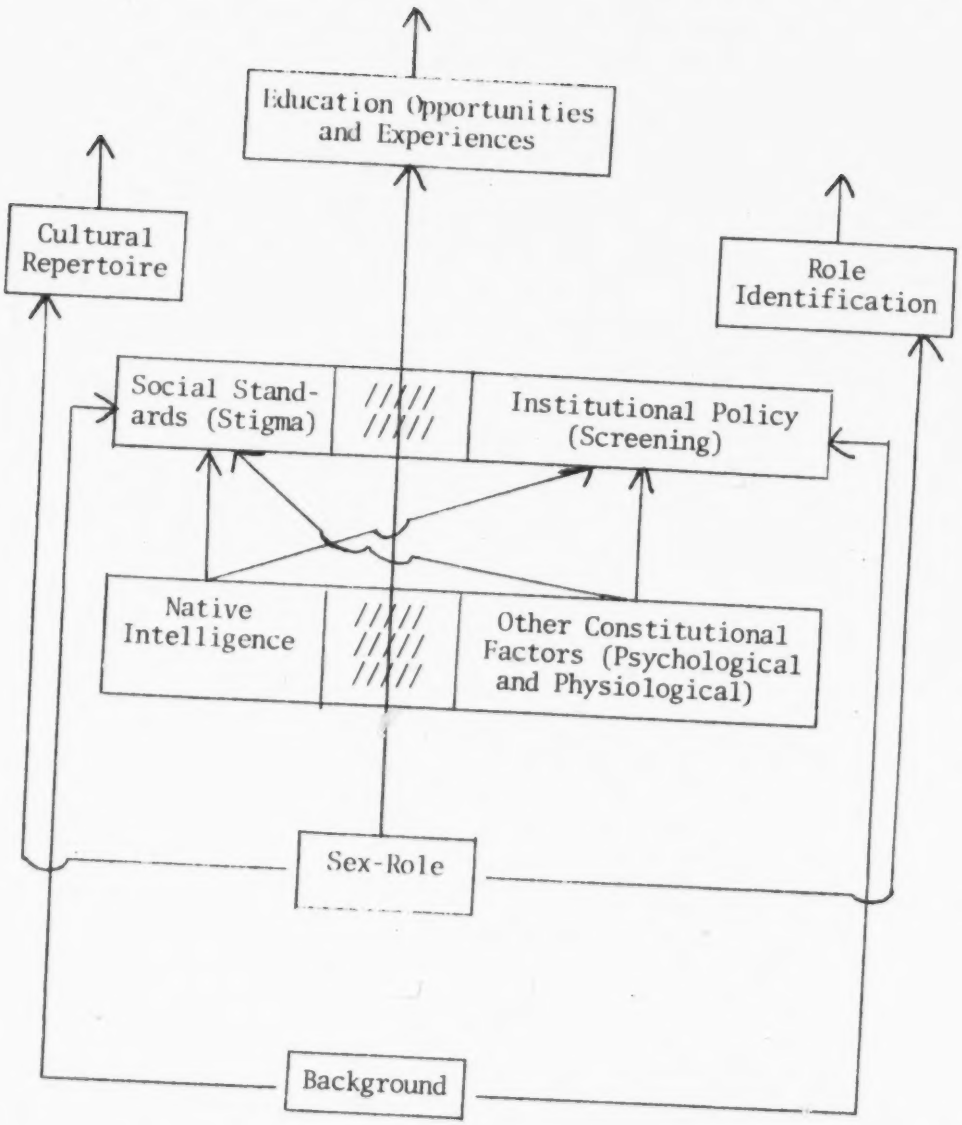

Figure 8. Impact of sex-role differentiation on educational opportunities and motivations mediated by 1) constitutional factors, and 2) informal and formal standards applied in screening out those whose sex, intelligence, or physical attributes are "inappropriately" matched to the circumstances.

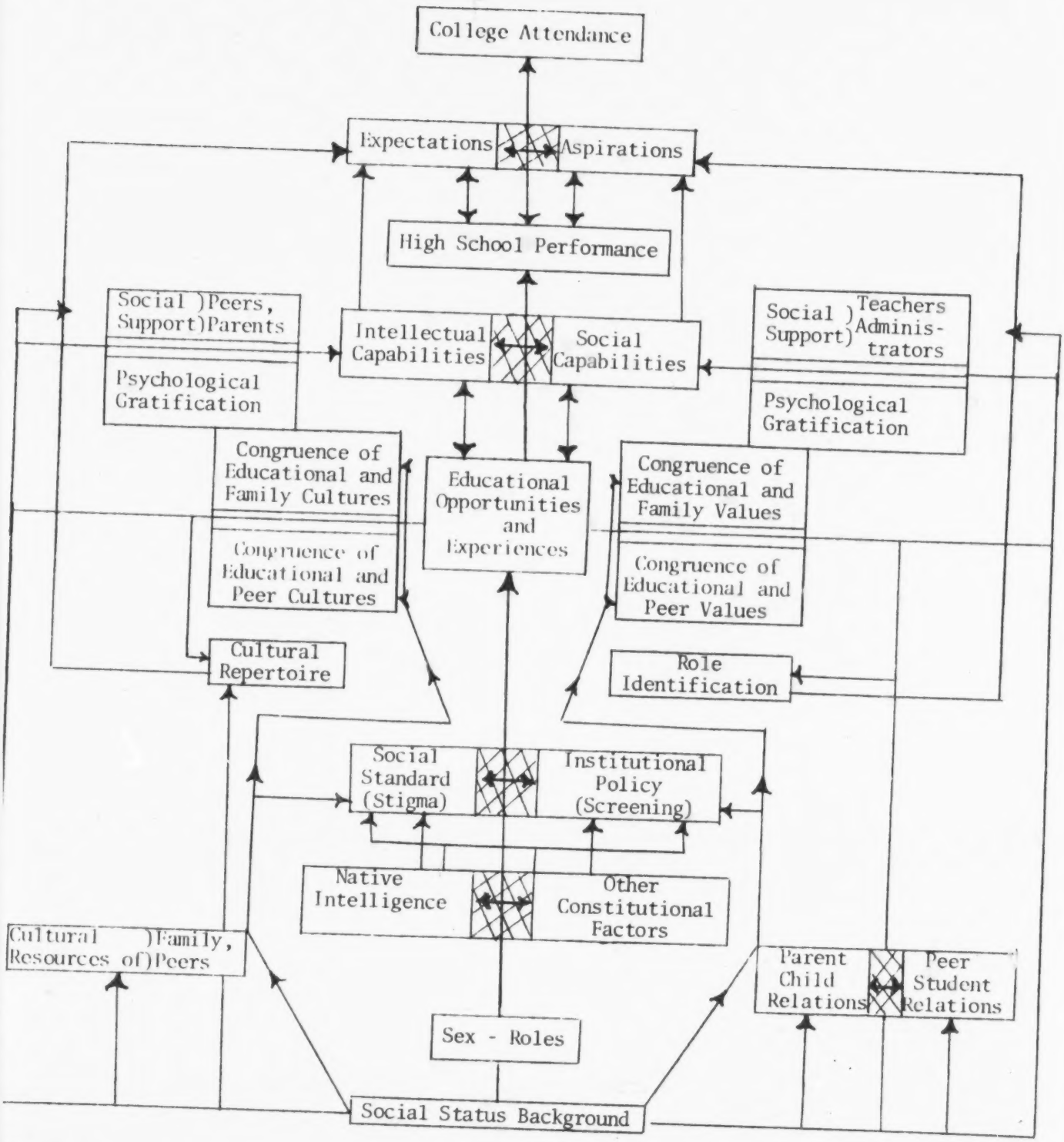
College Attendance
Expectations
Aspirations
High School Performance
Social)Peers, Support)Parents
Psychological Gratification
Intellectual Capabilities
Social Capabilities
Social)Teachers Support)Administrators
Psychological Gratification
Congruence of Educational and Family Cultures
Congruence of Educational and Peer Cultures
Educational Opportunities and Experiences
Congruence of Educational and Family Values
Congruence of Educational and Peer Values
Cultural Repertoire
Role Identification
Social Standard (Stigma)
Institutional Policy (Screening)
Native Intelligence
Other Constitutional Factors
Cultural)Family, Resources of)Peers
Parent Child Relations
Peer Student Relations
Sex - Roles
Social Status Background

Figure 9.

DEVELOPMENT OF CLASSIFICATION CATEGORIES

Our theoretical models will provide us with two kinds of categories. In categorizing variables, the conceptual components of the models will function as major categories. Further subdivision of these categories into several dimensions will expand the list of categories within which variables may be classified.

Classification categories with respect to findings also employ the conceptual components derived from our theoretical models. However, rather than creating categories out of single concepts, as was the case for variables, categories will be formed by stipulating the important relationships between concepts implied by our models, or better, by the data contributing to them. Thus in the process of integrating findings within the framework of a theory, not only are findings afforded mutual significance, but in addition a theory or paradigm is tested.

Since each of our four anticipated models relates to a distinct research problem, four complete sets of categories of variables and findings will be generated. Naturally, there will be overlap in variables and findings across the model frameworks. However, the desirability of identifying multiple interpretations of individual findings appears deserving of the additional efforts involved.

The Model as a Basis for Integrating Variables

An important by-product of any conceptual scheme is the groundwork for stipulating the types of variables needed for carrying out a research problem. Our model, of course, is no exception. One important advantage of this kind of model is its breadth of coverage. While no operational research is immediately explicit, the broad classifications of the model suggest to the sophisticated researcher a whole gamut of sub-problems and relationships, of multiple dimensions defining each conceptual component. On the other hand, the model as a unit does not lend itself to practical research operations, each portion of the model merely suggesting the kind of relationship which must be researched rather than elaborating the details of a researchable problem. Thus, the perfect combination of variables a researcher must use, while informed by the model classifications, cannot be determined by them.

The classification of variables may procede from the model components themselves. Since each component is specified at a rather high level of generality, some effort in breaking each component down into its pertinent dimensions will be attempted, adding further conceptual sophistication to the classification network. Prototype classification schemes related to college flow follow.

Classification of variables (categories are conceptual domains under which variables will be listed)

A. College Attendance (outcome variables)

1. Post-high school occupational activities
2. Type of post-high school educational institution attended
3. Length of time
   culation in college, university, or vocational-technical school
4. Persistence in post-high school education

B. High School Performance

1. Class standing (grade point average)
2. Standardized tests (e.g., SAT, IOWA, etc.)
3. Leadership and participation
4. Teacher, counselor or administrator "records"
5. Personal development (behavioral measures)
6. Personal development (psychological measures)
7. Cognitive development

C. Expectations

1. Financial resources, parents and self
2. Geographical proximity of desired school
3. Prospects for successfully competing in higher education (self-assessment)
4. Perceptions of occupational rewards (or other payoffs) associated with higher education
5. Perceptions of difficulties in making the social adjustment from high school to college

D. Aspirations

1. Vocational goals and plans
2. Educational goals and plans
3. Educational values
4. Vocational values
5. Educational status preferences
6. Vocational status preferences
7. Marriage and life style preferences

E. Intellectual Capabilities

1. Intellectuality
2. Creativity
3. Dogmatism
4. Intelligence ("learned")
5. Verbal skills
6. Logic Skills
7. Motor skills

F. Social Capabilities

1. Independence
2. Emotional stability
3. Responsibility
4. Cooperation
5. Sociability skills

G. Educational Opportunities and Experiences

1. School characteristics (facilities)
2. Teacher characteristics and attitudes
3. Student body characteristics
4. Administration (goals, policies, decision-making)
5. Curriculum
6. Teaching techniques
7. Student cultures
8. Student-teacher relationships
9. Student-administration relationships
10. Formal learning participation and experiences
11. Informal learning participation and experiences

H. Cultural Repertoire

1. Arts stimuli
2. Sciences stimuli
3. Occupational stimuli
4. Political stimuli
5. Religious stimuli
6. Sports stimuli
7. Community and social class stimuli (norms, values, standards)

I. Role Identification

1. Socializing agents
2. Role prescriptions transmitted
3. Perceptions of one's roles
4. Perceptions of one's status in role relationships
5. Commitment to one's roles and associated values
6. Role models identified with (persons or groups)

J. Social Status Background

1. Socioeconomic status of parents
2. Mobility of parents
3. Community and neighborhood SES characteristics
4. Community and neighborhood culture
5. Ethnic and racial characteristics of parents
6. Ethnic and racial characteristics of community and neighborhood

K. Social Stigma

1. Race, ethnicity, and social class
2. Language
3. Religion
4. Physical or mental handicaps
5. Health
6. Sex

L. Institutional Screening Policies

1. Enrollment criteria
2. Tracking or segregation criteria
3. Counseling practices

M. Constitutional Factors

N. Family Cultural Resources

1. Parent intellectuality
2. Parent estheticism
3. Books, magazines, television, hi-fi, etc. in the home
4. Intellectuality of older siblings
5. Estheticism of older siblings
6. Family discussion

O. Peer Cultural Resources

1. Activities
2. Interests
3. Discussion topics

P. Parent-child Relationships

1. Authority and influence (e.g., decision making)
2. Responsibilities
3. Style and warmth of interpersonal bonds

Q. Peer-student Relationships

1. Homogeneity of characteristics
2. Intensity of involvement
3. Closeness of interpersonal bonds
4. Status among peers

R. Cultures (school, family, and peer)

1. Norms
2. Attitudes, beliefs, and orientations
3. Information or knowledge

S. Values

1. Education
2. Occupation
3. Family life
4. Politics
5. Religion
6. Sexual relationships

Classification of College Attendance: Findings and Issues

I. Patterns of Post-High School Flow

a. High school performance and post-high school flow

b. Educational opportunities and experiences as determinants of post-high school flow

c. Social class and community effects on post-high school flow

d. Constitutional factors and post-high school flow

II. High School Performance and Post-High School Flow

a. Interaction effects of high school performance, expectations, and aspirations on post-high school flow

b. Relationship between high school performance and expectations

c. Relationship between high school performance and aspirations

III. Educational Opportunities and Experiences

a. High School performance as a function of educational opportunities and experiences

b. Interaction effects of educational opportunities, intellectual capabilities, and social capabilities on high school performance

c. Influence of educational opportunities and experiences on intellectual capabilities

d. Influence of educational opportunities and experiences on social capabilities

IV. Social Class Environment and High School Performance

a. Differential educational opportunities and experiences corresponding to social class position. Implications for high school performance.

b. Social class environment and intellectual capabilities

c. Social class environment and social capabilities

V. Intellectual Capabilities and Social Class Environment

a. Importance of cultural repertoire for intellectual capabilities

b. Influence of social class environment on cultural repertoire

c. Interaction effects of family and peer group cultural resources on cultural repertoire

VI. Social Capabilities and Social Class Environment

a. Importance of socialization and role identifications for social capabilities

b. Influence of social class environment on role identification

c. Interaction effects of family and peer group relationships on socialization and role identification

VII. The Effects of Educational Opportunities and Experiences on Cultural Repertoire and Role Identification

a. Congruence of cultures (family, educational, peer)

b. Congruence of values (family, educational, peer)

VIII. The Role of Social Supports

a. Parental encouragement

b. Peer status

c. Teacher sanctions

d. Interaction of social supports and psychological gratification

IX. Constitutional Factors

a. Sex

b. Intelligence

c. Physical and mental handicaps

d. Health

X. Social Stigma and Institutional Screening

a. Variations by social class

b. The special problem of I.Q. scores

c. Physical and mental handicaps

XI. Social Sources of Expectations and Aspirations

a. Intellectual capabilities

b. Role-identification

c. Social class

d. Sex

e. Intelligence

XII. Conclusions

a. Substantiated findings

b. Unsubstantiated findings

c. Unexplored areas

d. Improving the theoretical framework on the basis of empirical findings.

e. Practical applications for research and development

CONCLUSION

The research to date has given educational planners and educators much to consider. There are strong indications, for example, that the development of traits leading to achievement in school begins long before the first grade. It is rooted in and highly affected by the complex of family and surrounding variables that constitute the socioeconomic environment, although it is generally little affected by school experiences after matriculation. Yet certain school experiences can have an effect on the development of students. This is true particularly if the programs providing these experiences are designed with the students' characteristics in mind from the start, and if they are maintained consistently throughout a number of grade levels rather than merely for a single term or year.

The development of cognitive skills are, of course, critical to students' educational progress. Also critical are such traits as self-awareness, awareness of the larger environment, a sense of self-esteem, a sense of self-competency and personal autonomy. These traits can be discerned in the early years of school and are predictive of behavior much later. The traits can also be modified, given facilitating educational settings and faculty characteristics.

Such facilitation is not automatic, however. A good deal more research and more sophisticated research will be required before it can be implemented adequately in a pervasive manner. Evidently items in much more need of attention in this respect include the following:

(1) Derivation and development of concepts, theory and models that have practical application for programs and subsequent student development across age and grade levels.

(2) Implementation of substantially more comprehensive research on school effects at the pre-college and post college levels.

(3) Development of a broad range of measurable criteria for school effects beyond persistence and grade point or standardized test achievements.

(4) Delineation and evaluation of the effects of specific programs in relation to concomitant programs, school settings or environments and in reference to specific sub-groups such as minority students, the educationally "advantaged" and "disadvantaged," the economically advantaged and disadvantaged, and those disposed to unusual creativity and/or achievement.

(5) More specifically, the delineation of educational effects across grade levels vis-a-vis peer characteristics, faculty characteristics, and teaching modes.

(6) Determination of the interaction of pertinent variables so that the combination of variables and circumstances most predictive of given criteria for given groups of students can be ascertained with relative accuracy.

(7) Determination of replicable features of highly evaluated programs.

(8) Development of expedient measurements of the variables of concern which will provide relatively economical comparative analyses across age and grade levels.

(9) Determination of the optimum effects of alternative design, sampling and statistical techniques in light of the research needs indicated in the present context.

A major objective of the present project is, to the extent

possible, to glean guidelines for these issues from the previous and current research under consideration. Apparently, however, an unprecedented, extensive, ongoing and coordinated research program is essential if these issues are to be met squarely and sufficiently.

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